ROBERT FORCZYK

DESERT ARMOUR

TANK WARFARE IN NORTH AFRICA

BEDA FOMM TO OPERATION *CRUSADER*, 1940–41

OSPREY

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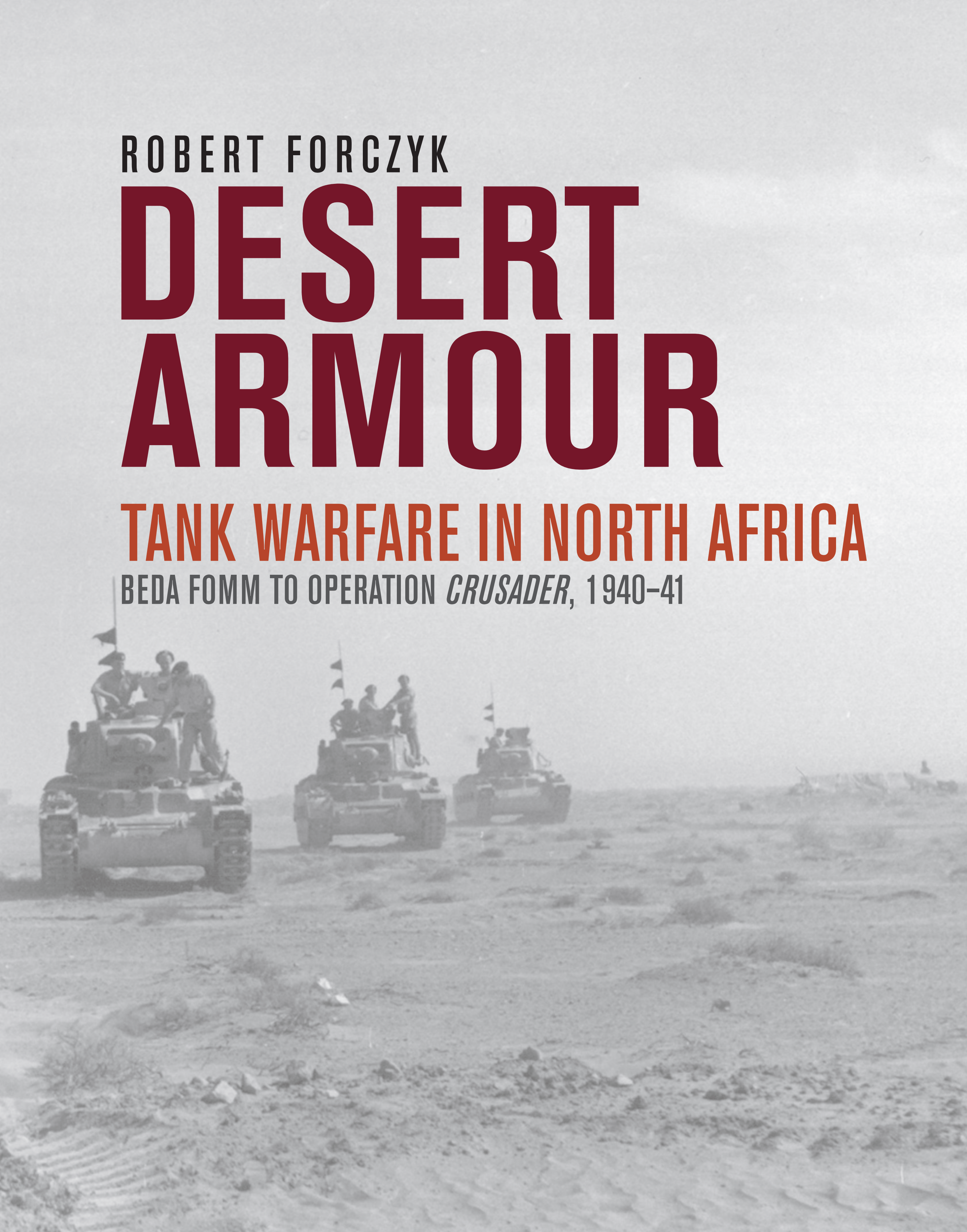

ROBERT FORCZYK

DESERT ARMOUR

TANK WARFARE IN NORTH AFRICA

BEDA FOMM TO OPERATION *CRUSADER*, 1940–41

DEDICATION

Dedicated to Colonnello Lorenzo D'Avanzo, commander of the IX Battaglione Carri Leggeri, killed in action 16 June 1940; Major Henry Rew, commander A Squadron, 7 Royal Tank Regiment (RTR), killed in action 9 December 1940; Obergefreiter Fritz Wilsdorf, 1 Kompanie, Panzer-Regiment 5, killed in action 2 April 1941 and Sergeant Delmer E. Park, 2nd Armoured Division, killed in action 25 November 1941.

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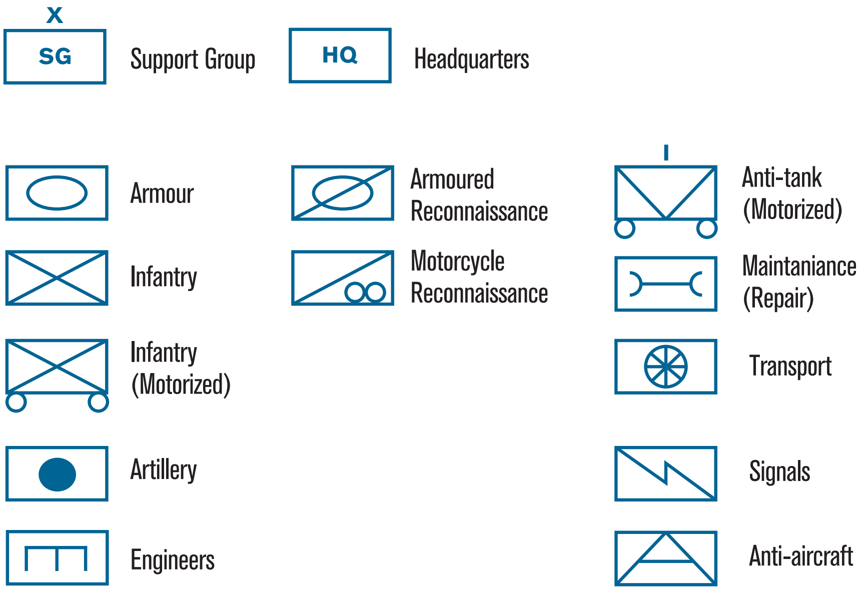
TACTICAL SYMBOLS


X
SG
Support Group
HQ
Headquarters
Armour
Armoured Reconnaissance
I
Anti-tank (Motorized)
Infantry
Motorcycle Reconnaissance
Maintaniance (Repair)
Infantry (Motorized)
Transport
Artillery
Signals
Engineers
Anti-aircraft

PREFACE

One of the most disconcerting aspects about moving tanks in the desert – aside from kicking up choking clouds of fine sand particles – is the lack of recognizable terrain features. Tactical navigation and orientation in the desert can be extremely difficult, due to the paucity of the kind of terrain features found in other regions. Distance can also be very deceptive, particularly with shimmering heat waves rising from the desert floor. At night, navigation in the desert is even more challenging, since everything appears to be the same. In North Africa in 1940–43, it was not uncommon for soldiers to walk off a short distance from their unit in the dark, then have difficulty finding their way back. In recent conflicts in the Middle East, tankers had the benefit of GPS for navigation and thermal vision, which greatly reduced the risk of getting lost in the desert, although mis-orientation (being pointed in the wrong direction) can still occur even if you know your exact position.

In contrast, the tankers who fought on both sides in the North African campaigns of 1940–43 had only magnetic compasses and their common sense for navigation. However, magnetic compasses do not work well on tanks, made of steel, forcing commanders to dismount to check their bearings. Maps also tended to be problematic, with features poorly marked, if at all. As a result, it was not uncommon for units and commanders to become lost or mis-oriented in the desert, particularly when exhausted or under the stress of combat, which could lead to serious consequences. In one famous incident on the night of 6/7 April 1941, the British generals O'Connor, Neame and Combe made a simple navigation error, ended up running into a German patrol and were captured.[1]

Deserts tend to excite the imaginations of armoured tacticians, who envision the wide open spaces as perfect for swiftly manoeuvering large mechanized forces. Senior commanders on both sides tried to manoeuver large armoured formations across desert wastelands, but found their pincers running out of fuel at inopportune moments. The school of 'tank zealots', fed on pre-war notions that tanks did not really need much infantry, artillery or engineer support to achieve decisive successes, found their theoretical form of mechanized warfare to be impractical on most occasions in the desert in 1940–43. While tank charges and wide encircling manoeuvres were possible in the desert, they did not necessarily lead to favourable outcomes. Indeed, the 'wide open spaces' often meant that the enemy could see tanks coming a long way off, which gave them more time to react and employ defensive fires. British tankers learned this lesson the hard way at Halfaya Pass in June 1941 and American tankers learned an even harsher lesson at Sidi Bou Zid in February 1943. Instead, experience taught that armoured warfare in North Africa worked best when combined arms tactics were applied within a framework of careful intelligence and logistic planning, ensuring that the armoured fist could strike a decisive blow under optimal circumstances.

INTRODUCTION

As with my two previous books concerning armoured warfare on the Eastern Front in the Second World War, my intent here is not to provide a chronological record of all military operations that occurred in North Africa in 1940–43. Rather, my intent is to provide a focused analytic account of armoured operations in this theatre, from the tactical and operational-level perspectives of both Allied and Axis combatants. Although the contributions of other arms of service are necessary to evaluate the effectiveness of each sides' efforts to employ their version of combined arms tactics, operations which were not armour-centric fall outside the scope of this volume. For the sake of definitions, some non-tank armoured fighting vehicles (AFVs), such as armoured cars, tank destroyers and assault guns will be considered within the context of armoured operations.

Much of my analysis is couched in terms of mid- to late-20th century military thinking, rooted in concepts such as the Principles of War, operational and tactical levels of combat, centre of gravity and culmination point. The meaning of these terms may seem arcane or confusing to academic or general readers, although they are employed so that my analysis is based on recognized methodologies, rather than subjective opinions. While the term 'Principles of War' is a bit fluid, with slightly different variations used by different militaries, it generally encompasses core ideas such as objective, mass, manoeuvre, economy of force, unity of command, surprise and flexibility. Simply put, in order to achieve success on the battlefield, an army needs to successfully incorporate as many of these factors into its planning process as possible. This book is meant to cover the operational level (division and above) to tactical level (below division) of combat, meaning that strategic issues tend to lie outside the scope of this work. Understanding culmination is an important part of evaluating the progress of offensive action – which is what armoured warfare is most concerned with – because it is the recognizable point at which the attacker no longer has sufficient strength or resources left to overcome the defence. A successful defensive operation forces the attacker to reach his culmination point sooner than intended. The concept of identifying the enemy's centre of gravity is an essential component of modern strategy, which began with the theories developed by Clausewitz in the 19th century; it is the factor which enables a combatant force to achieve its objectives. The centre of gravity might be logistics, communications or a unique military capability, without which the combatant will fail. Operations that target a valid enemy centre of gravity are more likely to achieve success at lower cost. Operations that do not target enemy centres of gravity are called battles of attrition.

Some readers may question why I put so much emphasis on pre-war doctrine and tank developments before moving on to the actual campaigns. The reason, I believe, is the essential need for context in historical evaluation – which is the purpose of this work. The armoured forces that fought in North Africa in 1940–43 did not spring up suddenly out of the sand but rather were the result of conscious pre-war decisions made about doctrine, training, likely missions and technology. It is an often painful but necessary component of military history to expose how pre-war decisions contributed to failure or success on the battlefield.

My own experiences as an armour officer in the US Army in the 1980s have helped to give me some insights into the dynamics of armoured operations, but are by no means unique. Likewise, my own experience in armoured logistic and military intelligence roles add some additional perspectives, but on the other hand, I have no direct experience of the Libyan Desert. Likewise, I have spent time around German, Italian and British tanks at Aberdeen Proving Grounds, but I never broke track on a Pz IV or punched the gun tube on a Matilda II. As a historian, I have come to recognize the limitations of personal perspectives, even when a participant lived through an event, since memories can grow vague in just a few years. Furthermore, having spent years talking with Second World War veterans, I can see that most participants were aware of their own unit and immediate surroundings, but lacked 'big picture' awareness. Most wartime tanker memoirs are written at the tactical level and very few address the kind of doctrinal or technical issues which are a necessary part of evaluating the effectiveness of armoured operations.

After reading about the Afrika Korps and Erwin Rommel for over 50 years, I'm frankly surprised that no one has yet written a beginning-to-end analysis of armoured operations in North Africa in 1940–43. Tankers who did serve in North Africa, such as Michael Carver and 'Pip' Roberts, have written some very useful accounts about armoured operations in North Africa, but primarily from the British perspective. It is also surprising that while the names of Rommel and Montgomery – who were not tankers – live on eight decades after El Alamein, the names of the squadron, battalion, brigade and division-level commanders who actually fought the major tank battles like Gazala, El Alamein and Kasserine Pass have all but disappeared. Nor has there been a serious effort to examine armoured operations in the Desert War in 1940–43 from a holistic perspective, incorporating the viewpoints and experiences of all the major combatants. This work is intended to help fill that void.

STRATEGIC SETTING

This first volume will focus on armoured operations in Libya and Egypt in 1940–41 and a second volume will cover armoured operations in 1942–43, including the Tunisian campaign. Although both Britain and Italy employed small armoured units in the East African Campaign in 1940–41, they will not be covered in this analysis. Likewise, the use of armour by Vichy French forces in the Syrian campaign of 1941 is also outside the scope of this work.

As far as terminology is concerned, Libya was often referred to as Tripolitania or Cyrenaica in 1940–42, which were the two sub-regions within the Italian-owned colony. However, I prefer to use the term Libya as much as possible, to avoid confusion.

TERRAIN AND WEATHER FACTORS

In looking at the North African theatre of war, the most important factor is the great distances involved to get anywhere. The distance from the main Italian port of Tripoli to Tobruk is 1,500 kilometres, and another 570 kilometres to El Alamein. In contrast, the distance from Berlin to Moscow is about 1,800 kilometres. Most of the tanks of this period required engine overhauls after travelling 1,500 kilometres which, given the to-and-fro movements involved in actual operations, meant that armoured units were effective for about two months of continuous activity before their declining operational readiness rates immobilized them. In 1937, the Italians completed a coastal highway known as the Via Balbia, which stretched over 1,800 kilometres from the border with French-held Tunisia to the border of British-held Egypt. The 12-metre-wide, asphalt-paved Via Balbia was the primary east-west transportation corridor and, without it, large-scale mechanized warfare in Libya would have been logistically unfeasible for the Axis. It is also important to remember that none of the combatants in this theatre of war in 1940–43 were native to this region and they had to bring virtually all of their equipment and supplies – every track pin, every ounce of grease, every round of ammunition – from great distances. Thus, the tyranny of distance was an important geographical factor that shaped operational outcomes for armoured warfare in North Africa.

At first glance, most deserts appear to be fairly flat and uncomplicated terrain, which sets the stage for dangerous assumptions. While much of North Africa is covered by the Sahara desert, there are thin fertile regions along the Mediterranean coast which are quite different in composition. Near the coast in Libya, there are a number of low-lying salt marshes or *sabkha*, which can be quite treacherous for unwary vehicles. Oftentimes concealed by a thin cover of wet sand, the salt marshes represent a natural obstacle that invites vehicles to become mired. Further inland, there are salt pans, which are large areas covered with salt and other minerals, left behind by the evaporation of bodies of water long ago. The salt pans are often marked by a thin white crust, which may conceal layers of sticky mud underneath. Not only are salt pans another potential driving hazard, but crossing them in daylight poses a tactical risk, since they offer no natural cover or concealment. In the sand sea (or *erg*) itself, there are large areas of the Sahara covered by sand dunes, which shift with the wind. Minefields laid in sand could be covered one day and a few days later be completely exposed. Deep soft sand could seriously slow vehicle movement and increase fuel expenditure. Although there were a few ancient desert camel tracks (*trighs*), like the Trigh el Abd south of Tobruk, they provided only a limited boost to trafficability. While some sand dunes in the deep desert could be over 100 metres in height, the ones in the main areas of military operations near the coast tended to be much smaller. Having been in Libya for some time, the Italians had generally figured out how to drive on or around sandy areas, whereas the Germans often needed to discover such things the hard way.

It is also important to distinguish between hard sand and soft sand, both of which pose different kinds of hazards for armoured operations. Hard sand is very granular and abrasive, which can cause excessive friction for tank tracks and running gear, which are in continuous contact with the substance. Tank tracks, with their many moving parts, want to fall apart and dry sand encourages this process. Nor do rubber-covered tank road wheels appreciate hard sand. On the other hand, soft sand tends to consist of finer particular matter, which gets kicked up by recurring sand storms or vehicles moving quickly over a soft patch. Soft sand was particularly debilitating for vehicle air filters, which protect engines from excessive dust ingestion. If enough dust was ingested by the engine, the oil in the engine and transmission would turn into a thickened sludge which would stop a tank more effectively than an anti-tank mine. British tank tracks on the A-9 and A-10 cruiser tanks were initially lubricated to reduce friction, but in the desert this quickly resulted in tracks fouled with sticky sand. As a result, the British stopped lubricating their tank tracks. In Europe, it was also standard practice to lubricate machine-gun bolts to reduce stoppages, but in the desert, even a light coat of oil would attract dust and result in a sludge-covered bolt that would not function until cleaned.

Dust storms, locally known as *khamsin* or *ghibli*, typically blew from the south and appeared for several weeks in April. The dust storms could last for up to two days and might be up to 100 kilometres in width, with winds of up to 140kph; when these storms appeared, military activity ceased and units hunkered down to wait them out. The *khamsin* also created a huge amount of static electricity, which caused problems with radio reception and could produce sparks that might ignite fuel or ammunition. Afterwards, equipment needed to be dug out and brushed off. On clear days, visibility in the desert could enable observation of enemy movements from much greater distances than normally possible. In particular, aerial reconnaissance made large-scale armoured movement difficult to conceal in the desert in daytime, putting greater emphasis on night movements.

Natural erosion from wind and water greatly influenced the terrain in Libya and western Egypt. Much of the coastal region in Libya is characterized by broad escarpment terrain, which consists of steep limestone cliffs, some up to 100 metres in elevation. High escarpment channels military movements into predictable mobility corridors and the few crossing points in the escarpment, such as Halfaya Pass, become key terrain. Yet even low escarpment can be problematic for vehicle movement, since these formations are usually topped with large, jagged stones. Desiccated terrain, typically ridgelines or rock outcroppings that have been splintered by erosion, can also prove to be a significant obstacle to vehicles. The most well-known example of this kind of terrain in the region – which had a major impact on armoured operations in 1942 – was the Qattara Depression in Egypt. To this day, the Qattara Depression remains virtually impassible. Natural erosion has also formed numerous *wadis* or valleys and *deirs*, which can provide excellent cover and concealment for small military formations. *Wadis* may also serve as water sources, particularly after seasonal rains. Some large *wadis*, such as the Wadi Derna and the Wadi al-Khalij, represent serious obstacles to vehicles of all kinds.

Not all of Libya was covered by desert. There is significant vegetation in some areas, particularly in the hilly Jebel Akhdar ('Green Mountain') region between Benghazi and Derna, which the Italians sought to develop into an agricultural zone. However, unlike other theatres of war, civilian settlements had negligible impact upon armoured operations in North Africa. The total population of Libya in 1940, including about 100,000 Italian colonists, was under one million. Aside from a few populated ports such as Tripoli (86,000) and Benghazi (33,000), there were hardly any civilian settlements or dwellings of consequence in the main areas of military operations.

In addition to sand storms, the impact of weather and temperature upon armoured operations in North Africa was just as significant as the effects upon armoured operations in Russia. It was, of course, extremely hot and bright in daylight, with the hottest period being June–September (average high temperatures being in the region of 80° F) and the coolest period being in December–March (60° F). Soldiers coming from temperate zones in Europe needed time to acclimatize to this harsh environment. The incidence of heat stroke (as opposed to heat exhaustion) was high in the North African theatre and could lead to death. At the time, tank gun barrels were not equipped with thermal sleeves, which meant that excessive heat could greatly reduce accuracy. Water was a consistent problem and every soldier needed a minimum of at least five litres per day, more if cooking and washing were included.[1] The German army reckoned on 3,000 litres of water per day for a battalion, not including water for vehicles or washing.[2] The Germans allocated 40 litres of water per tank every two days. Each British cruiser tank also needed 32 litres for its water-cooled engine, adding up to over 1,500 litres for all the tanks in an armoured battalion. Each British armoured battalion had four water trucks in their 'B echelon', which carried a total of 3,000 litres. Soft-skinned vehicles and water-cooled machine-guns also needed water, or they over-heated. Unlike battlefields in Russia, the North African battlefield saw limited rainfall and water sources were generally hard to find; a short rainy period occurs in December–February.

In part due to the consumption of contaminated water and in part due to the plethora of indigenous insect-borne infection vectors, the North African theatre of operations presented a significant biomedical threat to troops from Europe and the United States. Swarms of flies, sand fleas and other parasites plagued both sides and helped to spread various pathogens. Rommel himself was afflicted by jaundice and amoebic dysentery at a critical moment in the campaign and large numbers of his troops were incapacitated with a variety of other environmentally induced maladies such as leishmaniasis, hepatitis B and diphtheria.[3] The British Army, with much longer experience of colonial warfare in the region, referred to these maladies as 'gippy tummy', but took more stringent measures to protect their troops through better field hygiene.[4] The much-vaunted Afrika Korps proved much less adept at field hygiene in the desert and suffered accordingly.

Overall, the North African theatre of operations was rough on both soldiers and their vehicles. Unlike Europe, there was no means for armies to 'live off the land' on the desert battlefields. Indeed, North Africa was a large, austere environment that forced both sides to use a few fixed bases as logistic springboards for short-term offensive lunges into the desert void. The seeming open nature of the terrain invited bold tactical audacity, but mistakes could prove extremely costly, and veteran troops gradually learned to adopt more cautious methods better suited to the environment.

CHAPTER 1

PRE-WAR DOCTRINAL AND TECHNOLOGICAL INFLUENCES

BRITAIN LOSES ITS LEAD IN ARMOURED WARFARE

'Battles are not won by clichés or Liddell-Hartisms.'

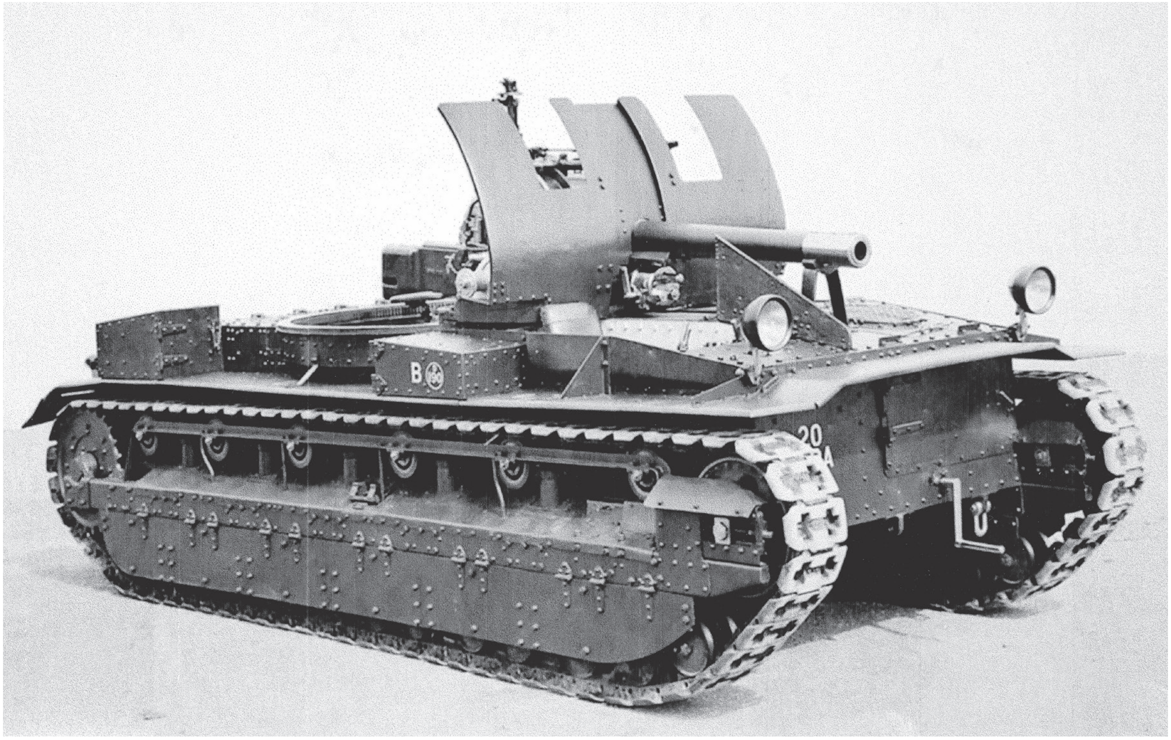
J.F.C. Fuller, 1937

Armoured warfare in North Africa in 1940–43 was heavily influenced by doctrinal and technical developments that occurred in the inter-war period following the end of the First World War. Tank technology revolved around three core functions – mobility, protection and firepower – and in order to build effective tanks, a balance had to be achieved between these functions. However, tanks were still very much cutting-edge technology in the period 1919–39 and the limited number of suitable engines had a major impact on the ability of armies to introduce new armoured fighting vehicles. Most tanks and tankettes built prior to 1935 were powered by low-torque petrol engines which delivered no more than 80–90 horsepower, which limited the size and speed of tanks. Indeed, the famous Matilda II tank went to war powered by two 87hp engines designed for city buses. Every tank design bureau also struggled to perfect effective transmissions and suspension systems, which slowed the creation of better armed and better protected tanks. It is also important to note that it generally required about three years to move from issuing a requirement for a new tank to initial production – and designs which were too conservative could become obsolete by the time they reached the field.

Winston Churchill, as Chancellor of the Exchequer, inspecting Vickers Medium Mk II tanks of the Experimental Mechanized Force (EMF) at Tidworth, 31 August 1927. General Sir Alexander Godley, in charge of Southern Command, accompanies Churchill. Churchill had been involved with tanks since 1915, but could not grasp their technical details or their doctrine. (Author's Collection)

The development of doctrine for armoured warfare rested squarely on experience from the Western Front in the First World War. Both the British and French armies invested heavily in the development of tanks in order to break the stalemate of trench warfare and their efforts paid off in 1917–18. Under the dynamic leadership of Brigadier Hugh J. Elles, Britain's Tank Corps quickly grew into a formidable combat force. On 20 November 1917, the first day of the Battle of Cambrai, Elles personally led the attack of nine tank battalions (with a total of 378 tanks), which achieved an 8-kilometre-deep penetration into a well-defended section of the German-held Hindenburg Line.[1] On 8 August 1918, on the opening day of the Battle of Amiens, the British committed 12 tank battalions with a total of 432 tanks and were able to advance up to 13 kilometres. At the Battle of St Mihiel in September 1918, the newly formed US Army Tank Corps successfully employed two battalions with 144 French-built Renault FT light tanks under the command of Lieutenant Colonel George S. Patton.[2] In contrast, the Imperial German Army took little interest in tanks and never employed more than a dozen of its clumsy A7V heavy tanks in a single action. Despite issues with mechanical reliability, the combat experience gained by the Allies in 1917 and 1918 demonstrated that tanks were quite effective in the infantry support role, capable of suppressing enemy machine gun positions and bunkers, which greatly facilitated the advance of conventional infantry. Most infantry officers were satisfied with that simple conception of the tank as a tactical-level combat multiplier.

During the First World War, the British Army used tanks as a corps-level fire support asset, not as a force capable of independent action in its own right. Although Elles had three tank brigades under his command, his armour was



In September 1925, the Woolwich Arsenal mounted QF 18-pdr guns (84mm) on the chassis of four Mk II medium tanks, thereby creating the first self-propelled guns in military history. The so-called Birch guns joined the EMF manoeuvres in August 1927. The tracked Birch gun was capable of keeping up with the tanks and firing HE or smoke rounds out to about 6 kilometres. However, the Birch guns were expensive, costing £12,250 each, and were retired in 1931. As a result, British armoured units would have to rely upon towed artillery for fire support until late 1941. (Author's Collection)

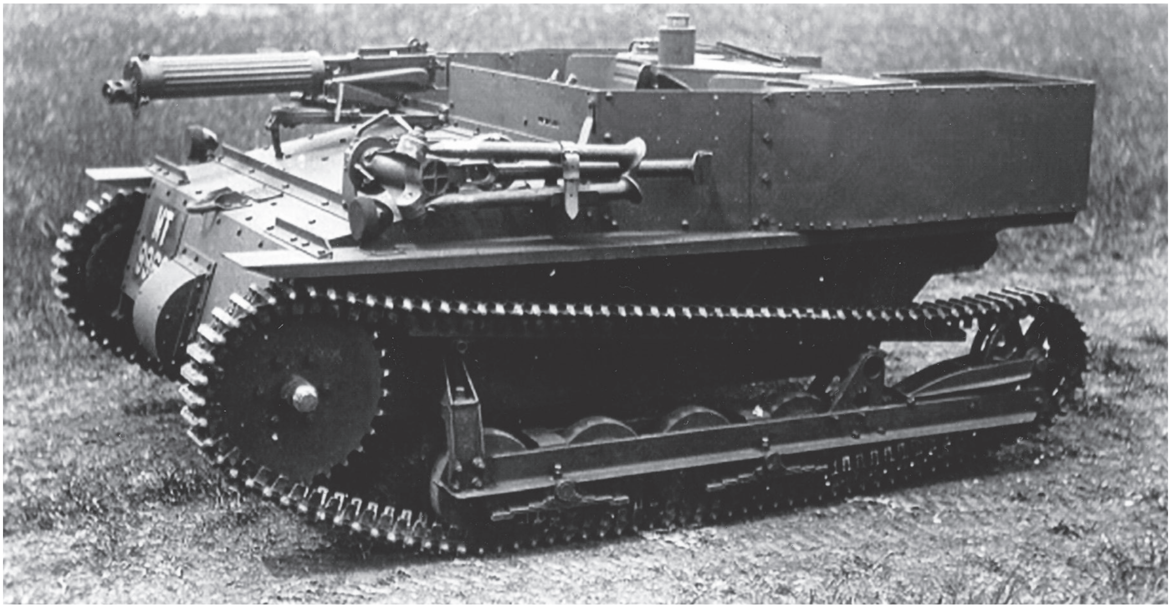
dispersed in combat, typically with one tank company supporting one infantry battalion. Battlefield experience in 1917–18 taught two important lessons: that armour achieved the best results when used in mass and that tanks were a finite resource, which quickly dissipated due to losses and mechanical defects. Essentially, the tanks of 1918 were regarded as capable of short, powerful offensive jabs, which required careful planning to successfully execute.

However, Colonel John F. C. Fuller, Elles' chief of staff of the Tank Corps, argued that tanks could be more than just an adjunct to the infantry, only capable of punching holes in an enemy's frontline and advancing a few kilometres. Fuller was one of the early tank zealots, who believed that the tank was a revolutionary weapon, like bombers or mustard gas, which would fundamentally transform warfare. After being briefed about the development of the new Medium Mark D tank – which was expected to have a speed of 32kph and a range of roughly 300 kilometres – Fuller began developing a theoretical model for future mechanized offensives.[3] He argued that medium tanks, supported by artillery, infantry and tactical air support, could create an initial breakthrough in an enemy front, then light tanks would exploit deep into the enemy's rear areas to disrupt their line of communications.[4] As a result, the enemy defence would be shattered in depth. Although historians have often referred to Fuller's concept as 'Plan 1919', that term was actually not coined until much later. Nor was Fuller the only officer to suggest that tanks could lead a powerful combined arms strike force – others did as well.[5]

Furthermore, it often goes unnoticed that it took much longer to perfect the Medium Mark D tank than Fuller expected and his concept was based upon future, not current, armoured capabilities. Britain's War Office did accept some of Fuller's ideas in a document produced in July 1918, entitled 'Memorandum on the Requirements for an Armoured Striking Force for an Offensive in 1919'. Had the First World War dragged on for another six months, Britain's Tank Corps was on the cusp of developing the tanks, doctrine and vision to conduct a form of manoeuvre warfare that embraced combined arms tactics. However, after the Armistice in November 1918, Fuller's grand vision was quietly shelved. Nevertheless, Fuller's concept created the germ of the idea that tanks might be capable of operating independently in order to achieve decisive operational-level results.

When the First World War ended, Britain's Tank Corps was reduced from 25 battalions to just four regular army tank battalions (2, 3, 4, 5 RTR (Royal Tank Regiment)).[6] Elles remained in command of the Tank Corps for several years, but his tank battalions were dispersed, possessed few operational tanks and did not conduct any large-scale collective training until 1925. Many of the senior officers in the RTC (Royal Tank Corps) became fiercely parochial and resentful of any attempts by the infantry or cavalry branches to usurp their monopoly on armoured vehicles. The French Army managed to keep 27 tank battalions with over 3,500 Renault FT light tanks in its post-war force structure, giving it the largest armoured force in the world in the 1920s, but all tanks were placed under the infantry.[7] General Jean Baptiste Estienne, in charge of the French tank force, opposed the relegation of his tanks to just the infantry support role and advocated the creation of a mobile army with 4,000 modern tanks. Given the limited post-war military budgets, it was easier for the French government to simply ignore Estienne and his ideas. Instead, the French government assigned only limited resources into developing a replacement for the Renault FT light tank and a new heavy infantry tank, which would not produce any substantive results for nearly a decade.

In the immediate aftermath of the First World War, most military officers recognized that technology had changed warfare, but it was difficult to determine which equipment and tactics would be most suitable for the future. In addition to tanks, chemical warfare and bombers also had their advocates. Increased motorization was generally regarded as desirable, since it was a fairly straightforward matter to purchase more trucks to increase the mobility of troops, artillery and logistic units. Nor did motorization require any great leaps in technology or major doctrinal changes. However, mechanization not only required a substantial investment in research and development to create new tracked vehicles, but sweeping doctrinal changes that would have profound effects on how armies operated in the field. During the inter-war period, a number of armies demonstrated interest in further developing tanks, but in each country, the process was hindered by two bottlenecks: technological problems (usually revolving around engines/transmissions and suspension systems) and lack of financial resources (which was a factor of political will).

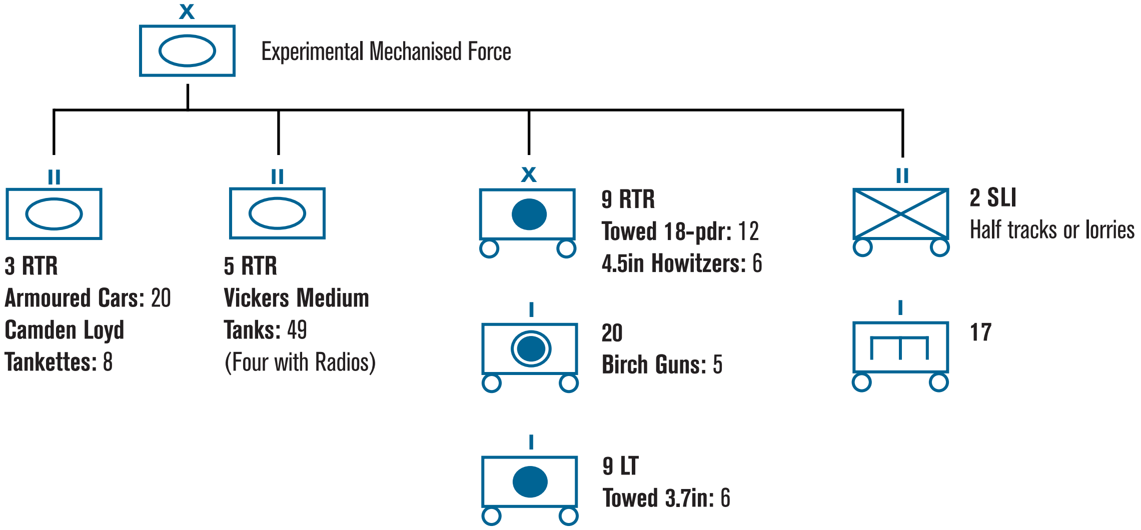


When the 1.5-ton Carden-Loyd tankette appeared in 1928, it seemed like an attractive option for cash-strapped armies which could not afford expensive new medium tanks. Both the British and Italian armies invested heavily in tankettes, which were good for training, just not for actual combat. (Author's Collection)

In post-war Britain, there was considerable support for both motorization and mechanization. As early as 1921, the War Office openly endorsed the motorization of the field artillery and senior leaders in the British Army were discussing the formation of an 'experimental brigade' to test new mechanized tactics and technology. Field Marshall Henry Wilson, Chief of the Imperial General Staff (CIGS) until 1922, was a strong advocate for the Tank Corps and envisioned an 'army capable of mobile combined arms action'.[8] Furthermore, the British Army's post-war doctrinal revisions, such as Field Service Regulations (1924), emphasized the kind of combined arms tactics that had been learned at such great cost in 1914–18.[9] However, Britain's post-war defence industrial base was so reduced that only two organizations were capable of developing new armoured vehicles: the state-owned Royal Ordnance Factory at Woolwich and the private firm of Vickers-Armstrong (which had its main tank development facility in Chertsey). As a result, the British Army had a very limited range of options to choose from in seeking new vehicles. Furthermore, the Army Estimates were repeatedly slashed, from £62 million in 1922 to £52 million in 1923 and £44.5 million in 1925.[10] From this reduced budget, over £8 million went to pay military pensions, another £8 million to pay the active army and £5 million for the Territorial Army, leaving less than £0.3 million for research and development on armoured vehicles. Given the adoption of the 'Ten Year Rule' in 1919, which forecast no major war for at least another decade, there was no political will in Britain to support increased expenditure on the army or tanks in the near future.

Despite these limitations, the War Office began to place orders for small quantities of new vehicles, including tanks, artillery tractors, armoured cars and half-tracked armoured personnel carriers. The Master-General of the Ordnance

BRITISH EXPERIMENTAL MECHANIZED FORCE (EMF), 1 MAY 1927


X
Experimental Mechanised Force
II
3 RTR
Armoured Cars: 20
Camden Loyd
Tankettes: 8
II
5 RTR
Vickers Medium
Tanks: 49
(Four with Radios)
X
9 RTR
Towed 18-pdr: 12
4.5in Howitzers: 6
I
20
Birch Guns: 5
I
9 LT
Towed 3.7in: 6
II
2 SLI
Half tracks or lorries
I
17

5th Department (MGO5) was responsible for developing tank technical requirements. In 1923, the first of 58 Mk I tanks were delivered, followed by 112 improved Mk II tanks between 1924 and 1928.[11] Although the 13-ton Medium Mk II tank was too lightly armoured for use in combat, it made an excellent training tank. By 1927, the Royal Tank Corps had over one hundred of the Mk I and Mk II medium tanks on hand. In addition, the War Office decided to purchase eight 1.5-ton Carden-Loyd tankettes (developed as a private venture by John Carden), eight 3-ton Morris-Martel tankettes and a number of Burford-Kégress halftracks to begin mechanizing three infantry battalions. The Royal Horse Artillery received enough Vickers Medium Dragon artillery tractors to mechanize one field regiment of 18-pdr field guns.[12] Once enough of the new tanks and artillery tractors were available, General Sir George Milne, the Chief of the Imperial General Staff (CIGS), and the War Office looked to the officers in the RTC for recommendations on how to forge these tools into a unified mechanized formation.

In the years since the war, J. F. C. Fuller had become an outspoken and influential advocate for tanks as well as bombers and chemical weapons, with his most important work being *The Reformation of War* (1923).[13] However, Fuller increasingly believed that tanks could win battles on their own and his theories soon diverged from combined arms thinking. In his mind, the infantry branch was obsolete and suitable only for defending fortresses. Furthermore, Fuller began to lean toward fantastic visions of ‘fleets of tanks’ and ‘land battleships’ conducting naval-style battles on land, rather than offering detailed recommendations on how to form and train mechanized units.[14] Fuller found himself bored with the parochial post-war army and sought the company of those who appreciated his visions, which led to his relationship with Basil H. Liddell Hart. Hart was a retired junior infantry officer who was working as a military correspondent for the *Daily Telegraph.* He was also a prolific journal writer and avid military historian who possessed a talent for ingratiating himself with politicians.[15] From 1920 on, Fuller and Hart regularly corresponded and discussed mechanization. Hart absorbed Fuller's zeal for mechanized warfare (and bombers) and adopted some of his ideas and modified others, later claiming them as his own.[16]

Yet despite Fuller's ardent proselytization for tanks, he proved remarkably reluctant to get involved with the actual process of developing mechanized units in the British Army. Colonel George Lindsay had far less vision than Fuller but he had practical combat experience leading an armoured car unit in Iraq in 1922. Upon joining the Royal Tank Corps, Lindsay recommended the formation of a brigade-size mechanized unit, with various support detachments, although he was not keen on the inclusion of infantry in the unit. Based upon his experience in Iraq, he also recommended that the brigade should work closely with tactical aviation. Lindsay was able to gain the support of General Milne, who authorized the Experimental Mechanized Force (EMF).[17] The brigade-size EMF would include one battalion of Mk I medium tanks (5 RTC), two squadrons of armoured cars and one squadron of tankettes for reconnaissance, one battalion of mechanized infantry, a motorized engineer company and a brigade of motorized artillery.[18] Fuller was the obvious choice to command the EMF, but he peremptorily turned it down and instead an infantryman, Colonel Robert J. Collins (who retained simultaneous command of the 7th Infantry Brigade), took the position. Hart tried to interfere with the EMF from the outset, writing an article that criticized the selection of an infantryman to lead the formation.[19] Fuller was a voluble theorist, but he was also a very odd bird, interested in the occult as much as tanks, and he distanced himself from the EMF and the mechanization process in the British Army, which ultimately left the effort without a clear vision.[20]

Collins formed the EMF at Tidworth on 1 May 1927 and commenced collective manoeuvre training on Salisbury Plain in August. Major-General John Burnett-Stuart, commander of the 3rd Infantry Division, directed the EMF exercises, and his chief of staff was Colonel Archibald Wavell. Under the influence of Colonel Charles Broad, an artilleryman who transferred to the RTC, the medium tanks spent a considerable amount of time trying to perfect the art of firing while on the move – which proved well beyond the technology of 1927. Tank crews were generally satisfied with the Mk II medium tank as a training tank, noting that it could move up to 80 kilometres 'without anything disastrous happening'.[21] In terms of collective training, there were two important differences in how the EMF trained, compared to how tanks had been used in the First World War. First, the tanks were not dispersed and used in direct support of infantry, but rather they were massed. The one infantry battalion involved played a very secondary role due to its limited amount of mechanized transport. Second, rather than attempting to breach fortified lines as in 1917–18, the EMF's tanks were trained to use bold encircling manoeuvres to place the enemy at a disadvantage, which was in line with Fuller's theories.[22] However, the EMF's manoeuvre exercises did not include any significant use of mines or obstacles, which enabled the tanks to move over fairly flat terrain unhindered by real world tactical issues. Lacking experience with mechanized units, Collins proved an overly cautious commander, which invoked further criticism from Liddell Hart, who was covering the manoeuvres for his newspaper. In the culminating field problem on 27 September 1927, the EMF was pitted against a conventional force from the 3rd Infantry Division and a brigade of cavalry. Both sides were provided tactical bomber and fighter sorties from the Royal Air Force (RAF), although many RAF leaders were unenthusiastic about the close support mission.[23] Despite the lack of radios, which proved a serious handicap for the EMF, the formation performed admirably.

In order to promote the development of new armoured fighting vehicles (AFVs) and improve coordination with private industry, in January 1928 General Milne created the Tank and Tracked Transport Technical Committee within the War Office. Colonel Sydney C. Peck, an artilleryman, was appointed director.[24] Peck was unusual in the British officer corps in that he possessed a civilian university technical degree. He formed the Mechanical Warfare Experimental Establishment (MWEE) at Farnborough to test new types of AFVs. Peck's appointment came as the War Office was struggling not just with developing tanks for the RTC, but creating requirements for a range of other tracked vehicles to mechanize the artillery, cavalry and infantry branches. In particular, there was pressure from Winston Churchill, Chancellor of the Exchequer, to prioritize mechanization of the cavalry, since horsed cavalry units were estimated to cost up to three times as much to maintain as armoured units.[25] In March 1928, the War Office directed two cavalry regiments (11th Hussars, 12th Lancers) to begin converting to armoured cars. However, the British Army only had a total of about 45 Rolls-Royce armoured cars on hand, which was not enough to equip even one cavalry regiment. Consequently, the War Office hastily approved the purchase of 30 Lanchester 6x4 armoured cars without waiting for technical evaluation by the MWEE. The two cavalry regiments quickly found that the 7-ton Lanchester was too heavy, particularly when tested in the desert, and Peck was forced to look for substitutes. As a result of the lack of suitable vehicles, it took three years to fully mechanize these first two cavalry regiments.

The development of the 1.5-ton Carden-Loyd Mk VI tankette attracted considerable attention both in Britain and abroad because it appeared to offer a short cut to rapid mechanization. The diminutive vehicle was cheap, mechanically reliable and easy to manufacture. Although only armed with a single machine-gun, about 15 Carden-Loyd tankettes could be purchased for the cost of a single medium tank. However, the actual combat value of the open-topped tankette was negligible and the EMF only used the Carden-Loyd tankette for reconnaissance and towing artillery pieces. Major Giffard le Quesne Martel, who commanded the engineer company attached to the EMF, was personally involved in the development of the Morris-Martel tankette and was a strong proponent of the tankette concept.[26] While the RTC officers were not impressed with the tankette, Martel, who was an advisor to Peck's directorate, touted the tankette as a potential solution to the mechanization of the other branches. Vickers-Armstrong purchased Carden-Loyd in 1928 and used the tankette as the basis to begin developing a new series of light tanks, which the General Staff eventually designated as the A-4 series. The Carden-Loyd design was also suggested as filling the infantry's need for a tracked weapons carrier and a spin-off eventually led to the Universal Carrier. Eventually, the British Army acquired over 300 of the tankettes. Foreign armies also became interested in the tankette and the Soviet Union purchased 20 of them.

Despite its full plate with requirements from the War Office, Vickers-Armstrong decided that it could open another revenue stream by developing armoured vehicles just for the export market. As a result, the firm began developing a new light tank known as the Vickers E 6-ton tank. The Vickers E came in two versions, one equipped with twin machine-gun turrets and the other equipped with a single turret mounting a 47mm gun. For its day, the Vickers 6-ton tank possessed a good mix of mobility, firepower and armored protection, which quickly attracted foreign orders; the Soviet Union purchased 15 (which it developed into the T-26 light tank) and both Italy and the United States purchased one each. Eventually, about 150 Vickers 6-ton tanks were sold abroad. Britain's War Office purchased one for evaluation, but the British Army regarded it as too expensive (at £4,200 per copy) and poorly made, and rejected it for service.[27]

In the summer of 1928, the EMF conducted another round of exercises. The commander of one of the mechanized infantry companies assigned to the EMF was Captain William H. E. Gott ('Strafer'), who would later play a major role in the British Army's mechanized operations in North Africa in 1940–42.[28] After the completion of the summer manoeuvres, the EMF was disbanded. At this point, the War Office signalled its commitment to the creation of a permanent armoured brigade after a period of evaluation and doctrinal reflection. Colonel Broad and Colonel Lindsay took the lead in developing a doctrinal product based upon lessons learned from the EMF, the *Handbook on Mechanized and Armoured Formations* (dubbed the Purple Primer), which appeared in March 1929. As a piece of doctrine, the Purple Primer was not particularly detailed, but it was regarded as a first step. A number of other officers involved in the EMF exercises, such as Lieutenant Colonel Percy Hobart and Major Martel, were also involved in discussions about how a follow-on armoured brigade should be trained and equipped. Hart, again inserting himself into the equation, criticized the disbandment of the EMF and suggested that the British Army was only paying lip service to mechanization.[29] It is important to remember that Hart was not a tanker, had never served with tanks and had been rejected when he tried to transfer to the Royal Tank Corps. Nor did Hart have any serious training in military theory, although he assisted with the preparation of the 1921 Field Training Regulations and used this editorial role to portray himself as a doctrinal expert. At one point, Hart claimed that he had developed the concept of infantry battle drills in 1918, which was one of his more ludicrous assertions.[30] Mechanization became one of Hart's hobbyhorses and, after the Second World War, he tried to portray himself as one of the early apostles of mechanization who not only directly influenced the development of British armoured doctrine, but German mechanized doctrine as well. Hart used his position as an activist journalist and military gadfly to minimize the contributions of others – including Fuller, Broad, Hobart and Lindsay – in order to shamelessly promote his own role.[31] Unfortunately, Hart's post-war popular histories and cultivation of sympathetic politicians thoroughly corrupted the actual historiography of the development of armoured warfare doctrine in the inter-war period.

In spite of Hart's criticisms, the British Army in the 1920s was committed to mechanization and was greatly out-spending any other army. Altogether, Britain spent over £1.5 million ($7.5 million) on tanks between 1920 and 1929, not counting funds devoted to other mechanization projects. Furthermore, the British Army's mechanization programme was proceeding, albeit slowly, despite the slashing of its budget to just over £32 million in 1929. In contrast, Italy and the United States spent about $1 million (£210,000) each on tanks during the same period. Amazingly, France spent only $160,000 (£34,000) on tanks in the 1920s, since the French were focused more on research than production. While the EMF exercises and the Purple Primer fell short of an ideal, they still enabled Britain to maintain its technical and doctrinal lead in mechanized warfare, which would gradually influence developments in other countries.

In the summer of 1930, the Royal Tank Corps formed another ad hoc armoured brigade, using three battalions of medium tanks and Carden-Loyd tankettes serving in the reconnaissance role. Unlike the EMF, this brigade was a tank-pure formation with no organic supporting arms, which made it something of a throwback. Nor was RAF support provided. The most significant change was the use of radio control from four specialized command tanks, although companies and platoons were still directed by flags. During manoeuvres on Salisbury Plain in the summer of 1930, the armoured brigade was split up with one battalion portraying an opposing force, which allowed for some tank versus tank training. Yet since artillery fire support, anti-tank mines and anti-tank guns did not play any real role in the exercises, there were no lessons relevant to combined arms warfare. After the exercise was completed, the brigade was disbanded. A similar experiment was conducted in the summer of 1931 with Colonel Charles Broad in command of another ad hoc brigade. To a significant extent, these tank brigade exercises were intended more as exhibitions for visiting dignitaries – a 'dog and pony show' in modern soldier parlance – rather than as serious efforts to develop and hone tactics and doctrine.[32] Conducting field exercises under non-tactical conditions, often with large crowds of spectators

close at hand, is no way to develop doctrine. The inclusion of ridiculous circus stunts, like ramming tanks through walls to impress spectators, further degraded the value of the summer exercises. Predictably, Hart was critical in his journalistic coverage of the disbanding of the brigade, claiming that an opportunity to create a true mechanized division had been squandered.

While it was true that the British armoured force was stuck in low gear and not heading in any particular direction, Hart ignored the context of the decision. Clearly a major factor in the loss of momentum was the British Army's declining budget – which hit its lowest point in 1932 – and this had a chilling effect on mechanization programmes. The Great Depression hit Britain hard in 1930–31, forcing the government to drastically reduce spending, including military pay cuts – which precipitated a mutiny at the Royal Navy base in Invergordon in September 1931.[33] With the British government facing a financial meltdown and social unrest, mechanization simply could not be afforded priority at this time. Not having any technical background, Hart also failed to appreciate the problems involved in developing better tanks from a small industrial base. Vickers had been trying to create an improved medium tank since 1926 to replace the Mk II, but the resulting Mk III (also known as the 16-tonner) was a disappointment and only three were built and used in the 1930–31 manoeuvres; one caught fire and was destroyed. Vickers' engineers persisted, developing two A-7 medium tank prototypes in 1929 and 1930, but these were plagued by various technical issues.

Yet even if the money and improved tanks had been available for mass production, the pacifist political climate in Britain in the early 1930s did not favour the creation of an offensive-oriented armoured division, when the public regarded the idea of another continental war as anathema. During the World Disarmament Conference in Geneva in 1932, both Britain and the United States proposed abolishing or limiting offensive weapons, including tanks, heavy artillery and chemical weapons. Amazingly, Liddell Hart pulled a volte-face and claimed that it was necessary to abolish tanks in order to prevent future wars, which attracted criticism from both Fuller and Winston Churchill. Later, the British delegation switched to the idea of limiting the size of new tanks to just 20–25 tons, but none of these proposals were ever enacted.[34] Germany and Italy at the time appeared willing to go along with limitations on offensive weapons, but this attitude proved insincere. While the Geneva disarmament conference eventually fizzled out, it did influence the British government's attitude against investing substantial resources into medium tanks.

As a result of these obstacles, new tank development ground to a halt in 1932–33 and the Royal Tank Corps conducted no collective training in 1933. However, Adolf Hitler's appointment as chancellor of Germany in January 1933, followed by his decision to withdraw from the League of Nations and the Geneva disarmament conference, did cause anxiety in the War Office. Sir Archibald Montgomery-Massingberd, who replaced Milne as CIGS in February 1933, recognized that Germany was likely to become a problem and took steps to resume the army's stalled mechanization programme. In

OPPOSITE
British light tanks from the 6 RTR on manoeuvres in Egypt 1936. The British Army had acquired some pre-war experience with mechanized operations in the desert, but it was not well suited against a peer enemy. (Mary Evans Picture Library, 11557783)

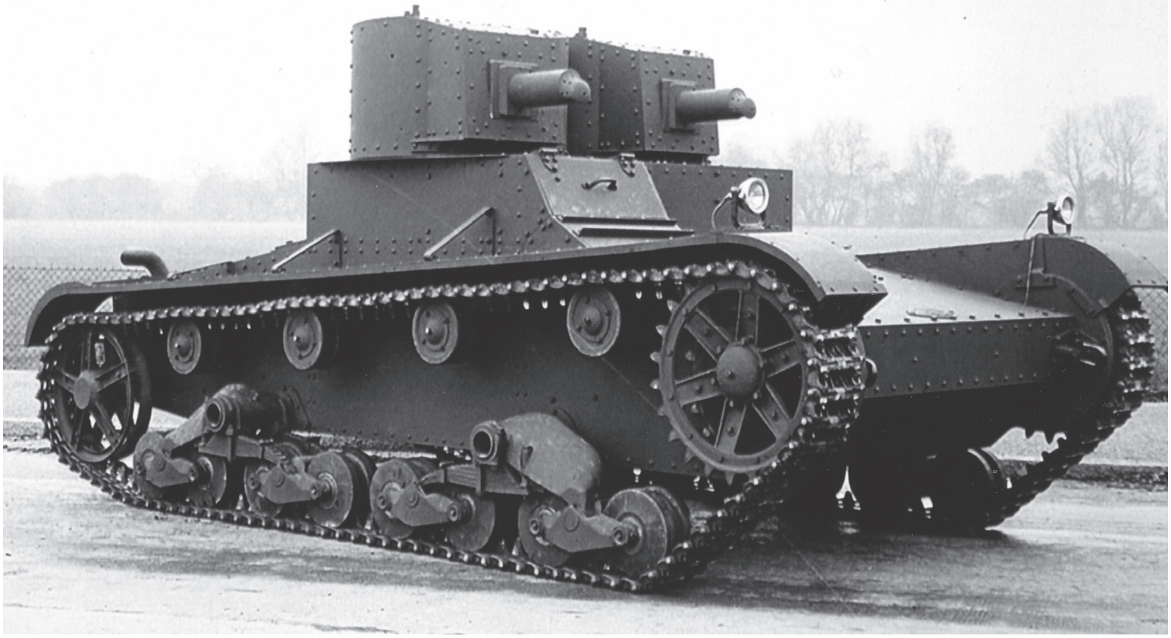
November 1933, the Defence Requirements Sub-Committee (DRC of the Committee of Imperial Defence was formed to make recommendations about rectifying critical deficiencies in Britain's three military services. Although only an advisory body, the DRC proved influential in shaping the future force structure of the British Army and its equipment requirements.[35] In particular, the DRC would recommend the out-fitting of an expeditionary field force, comprising five divisions and one armoured brigade.

In April 1934, Montgomery-Massingberd authorized the establishment of a permanent tank brigade, but only as a tank-pure formation. Brigadier Percy Hobart was given command of the 1st Tank Brigade, which consisted of three existing tank battalions (2, 3, 5 RTC and the newly formed 1st (Light Battalion. Hobart had gained experience with tanks during the earlier summer manoeuvres but, like Fuller, he played poorly with others and had become an arrogant tank zealot with little patience in dealing with the other branches. He also was socially stigmatized in the small pre-war regular officer corps due to an adulterous affair involving a junior officer's wife.[36] One of the few officers Hobart got along with was Bernard Montgomery, his brother-in-law. Hobart proved to be an exceptionally poor choice to try and lead the formation of a combined arms team. In October 1934, Montgomery-Massingberd expressed his willingness to create a mobile division, incorporating Hobart's tank brigade with a motorized infantry brigade and a motorized artillery brigade.[37] The next month, an ad hoc 'Mobile Force' was created for evaluation, with Lindsay placed in charge of the division-size formation. Unfortunately, Hobart worked poorly with Lindsay and the mobile division was given poor marks by the 3rd Infantry Division staff, resulting in Lindsay's discomfiture. Soon thereafter, the mobile division was dissolved.

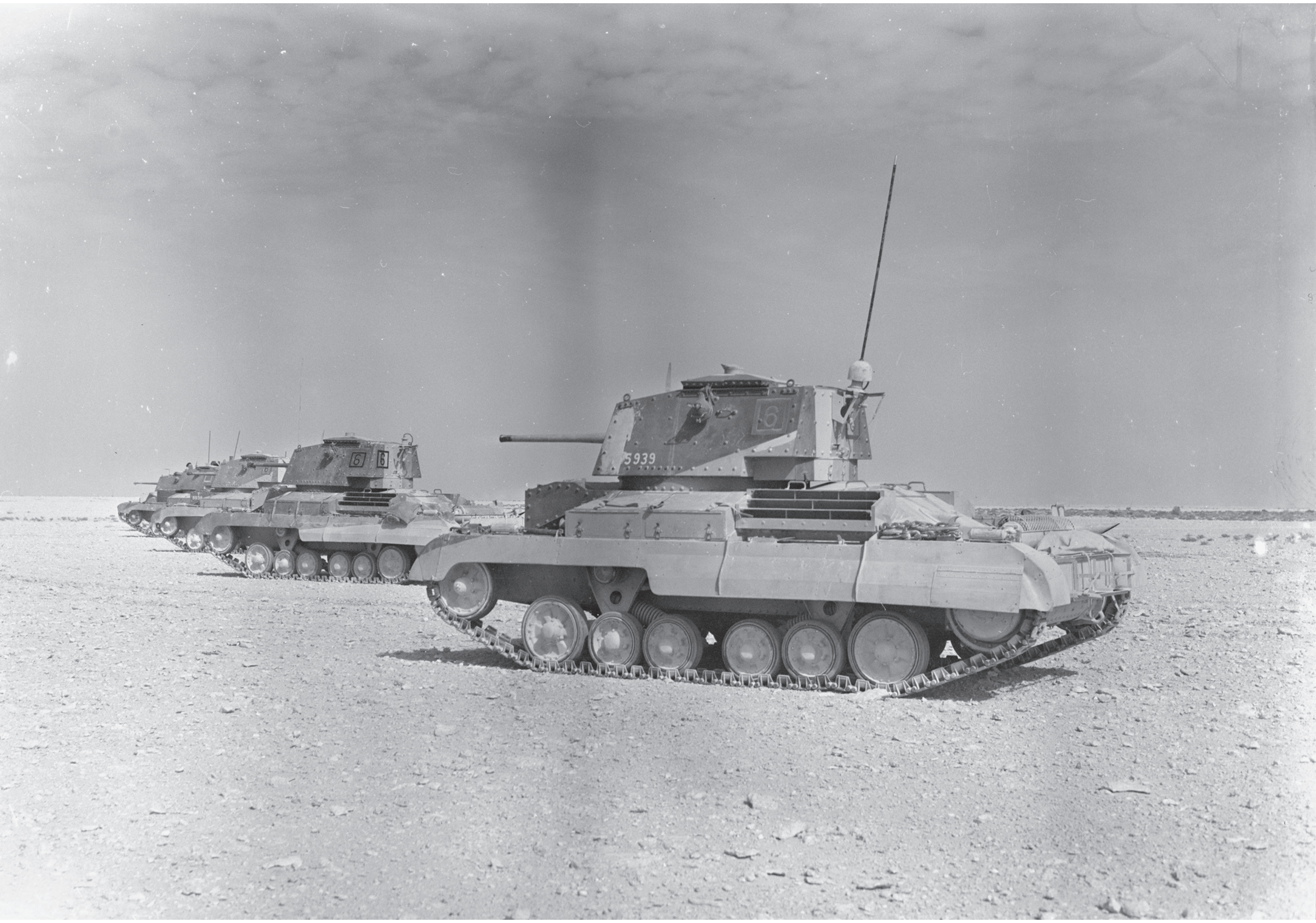
After nearly a decade of use in training, most of Hobart's Mk I and Mk II medium tanks were worn out (no spare parts were available and would soon need replacement if the tank brigade was going to have anything more than tankettes and a few light tanks. A trickle of new light tanks were entering service in the early 1930s. In April 1931, Vickers delivered the first of its machine-gun-armed Mk II light tanks developed from the Carden-Loyd tankettes, followed by the slightly improved Mk III and Mk IV versions in 1934. The RTC was allowed to form a new battalion, the 1st (Light Battalion, from its depot personnel and they were equipped with one squadron of armoured cars and one of the new light tanks. Vickers continued to invest resources in upgrading this rather basic two-man vehicle, and the early versions were cheap enough (£2–3,000 that even the cash-strapped Army could afford to purchase up to 50 in one year. Vickers also began tailoring some of the light tanks for overseas service; the Mk III versions were tropicalized for use in hot weather climates like Egypt or India. Although the RTC was given enough of the new light tanks to outfit several tank squadrons, most of them were destined to equip the new mechanized cavalry regiments.

While Hobart was training his brigade, the War Office was trying to find an economical way of developing a new medium tank. Lieutenant General

Hugh Elles, who had commanded the Tank Corps in the First World War, became head of the mechanization branch in the War Office and the Master General of the Ordnance (MGO) in 1934. In these roles, Elles pushed hard for the acquisition of a modern infantry tank, even though Hobart's brigade was not training for the infantry support role. In June 1934, the British War Office wrote General Staff specification A-9, outlining the requirements for a new infantry tank armed with a 2-pdr (40mm) gun. Vickers-Armstrong was still trying to perfect its A7-series tank, but after five years the prototypes were plagued by weak suspensions and poor mechanical reliablity. Nevertheless, Vickers-Armstrong tried to leverage the lessons learned from its past failures in order to develop a new tank to meet the A-9 requirement. John Carden, Vickers' lead tank designer, arbitrarily insisted on mounting two machine-gun sub-turrets on the prototype, which added cost and complexity. He also limited the armour thickness to just 14mm to save weight, thereby ensuring adequate mobility. Apparently the War Office did not pay close attention to Carden's design changes until the A-9 project was well under way, but when they did, they simply created a new requirement (designated the A-10 project), which eliminated the sub-turrets and increased armoured protection to 30mm. Further complicating the situation, in November 1935 the DRC recommended the creation of four independent tank battalions for infantry close support, in addition to the armour in a mobile division. Elles decided that a cheap but well-protected infantry tank armed only with a machine-gun would suffice for these new battalions, so the War Office drafted another specification, numbered A-11. Vickers duly began work on the A-11 specification as well. Based upon the DRC recommendations, the War Office



The Vickers Mk E 6-ton tank, designed for export in 1929–30, had a major impact on tank designs in Germany, Italy and the Soviet Union. The British Government turned a blind eye to Vickers selling its tanks to potential adversaries, who then used it to accelerate their own AFV design efforts. (Author's Collection)



A troop of A-10 Cruiser Mk II in Egypt in 1940. On paper, the A-10 seemed like a good early war tank, but it suffered from inadequate armoured protection and mechanical unreliability. Britain invested heavily in the cruiser tank concept, which was regarded as the *sine qua non* for mechanized manoeuvre warfare. However, the first cruiser tanks were not available until 1939, so doctrine had to be developed through trial and error on the battlefield. (IWM, E1001)

managed to get a token boost of £192,000 for tank development from the 1934–35 Army budget, but spreading this across three different tank programmes was a poor management decision by Elles.

While Vickers-Armstrong was juggling these three distinct tank development programmes, disaster struck – John Carden was killed in an air crash in December 1935. Vickers put Carden's deputy, Leslie F. Little, in charge of bringing the A-9, A-10 and A-11 programmes to fruition. Little focused on expediency rather than innovation. In July 1936, Vickers-Armstrong was able to demonstrate the A-9E1 prototype, which was a clumsy, fragile 12.7-ton beast. On the positive side, the A-9E1 had a hydraulically operated turret which mounted the new 2-pdr (40mm) gun, and it was faster than the obsolescent Mk II medium. However, the A-9E1 mounted two awkward machine-gun sub-turrets on the front hull and the suspension system had two different size road wheels. In addition, the A-9E1 had poor armoured protection and was prone to throwing its narrow tracks. Nor was the A-9E1 cheap, with a unit price of £12,700, but at least it was ready for limited production. The War Office hedged its bets by accepting the A-9 for service as the Cruiser Mk I, but decided to wait a year before placing a limited production order, hoping that the improved A-10 would soon be available. Instead, the over-extended Vickers design team struggled to perfect the A-10 tank and the programme fell so far behind schedule that it was not ready to enter production as the Cruiser Mk II until December 1939. Running out of options, the War Office finally placed an order for 125 Cruiser Mk I tanks in late 1937, under the theory that some poor-quality medium tanks were better than no medium tanks. Vickers did succeed in completing a prototype for the A-11 infantry tank in September 1936. The 11-ton prototype boasted 60mm-thick armour but otherwise it was hopelessly slow and under-armed, which caused the War Office to develop yet another specification for an infantry tank armed with a 2-pdr gun, which became the A-12 specification. Due to the death of Carden and the belief that Vickers was overwhelmed by its current projects, the War Office decided that the Royal Arsenal at Woolwich should design the A-12 infantry tank. Despite misgivings about the limited capability of the Vickers' A-11 prototype, the War Office accepted it as the Infantry Tank Mk I and issued production contracts in 1937.

While Vickers was struggling to develop its medium tanks, the War Office began to consider the merits of fast cruiser tanks. Elles' deputy, Lieutenant Colonel Martel, had recently returned from an inspection trip to the Soviet Union, where he had been most impressed by the Red Army's BT-2 fast tanks, derived from Walter J. Christie's M1928 tank. While the British Army had not previously paid much attention to the novel Christie suspension system – which had been around for more than a decade – it suddenly seemed like a way to bypass Vickers' design limitations. Martel not only managed to convince the War Office to purchase a sample tank from Christie, but that it would be prudent to incorporate the superior Christie suspension system into a new cruiser tank. While Martel's recommendation was good in theory, it would take at least a year or more for Vickers to develop a new tank based on the Christie suspension, and the British Army needed new tanks as soon as possible or there would be no mobile force. Nevertheless, in late 1936 the War Office developed specification A-13 for a new cruiser tank, based on the Christie suspension and armed with a 2-pdr gun. Recognizing that it was time to enlist more companies in the development of armoured fighting vehicles, the War Office took the risky step of asking a start-up company, Nuffield Mechanization and Aero Ltd in Birmingham, to work on the A-13 project. Nuffield was able to produce a prototype A-13 by October 1937 which improved upon the Christie suspension, but the War Office decided to place only a limited production order and asked Nuffield to develop an improved model; these would become the Cruiser Mk III and Cruiser Mk IV tanks.[38] By the winter of 1936/37, the War Office was pursuing no less than five different tank programmes, although no medium tanks were actually in production. In fact, the only tanks currently being manufactured in Britain were the 5-ton

Vickers Mk V and Mk VI light tanks, armed with machine-guns and intended primarily for the mechanized cavalry regiments.

It is noteworthy that while the War Office was willing to incorporate American-designed off-the-shelf tank technology into their new medium tanks, no consideration was given to encouraging technical exchanges with the French on tank design. Despite a protracted development effort due to financial limitations, by the mid-1930s French tank designers at Hotchkiss, Renault and Somua were beginning limited production of several promising tank designs. French designers were already using welding in construction, unlike Vickers' continued reliance on riveted construction. In particular, the Somua S-35 cavalry tank was better armed, better protected and as fast as any of the Vickers' designs. The French were also beginning to form their armour into larger combined arms formations, beginning with the 1ère Division Légère Mécanisée (DLM) in July 1935 and the 2e DLM in July 1937. Certainly the French were interested in British tank developments. General Maxime Weygand, the French Army chief of staff, was invited by Field Marshal Montgomery-Massingberd to visit Britain in 1933 and observe British tank manoeuvres at Tidworth.[39] In return, Montgomery-Massingberd was invited to observe the French DLMs in training, but these exchange visits produced no tangible results. Likewise, Hugh Elles and Martel went to Paris in January 1937 for limited discussions on tanks with their French counterparts, but without result.[40] Unfortunately, the governments of Ramsay MacDonald and Stanley Baldwin both frowned upon any kind of serious Anglo-French military collaboration, which ultimately contributed to the military unpreparedness of both nations.[41]

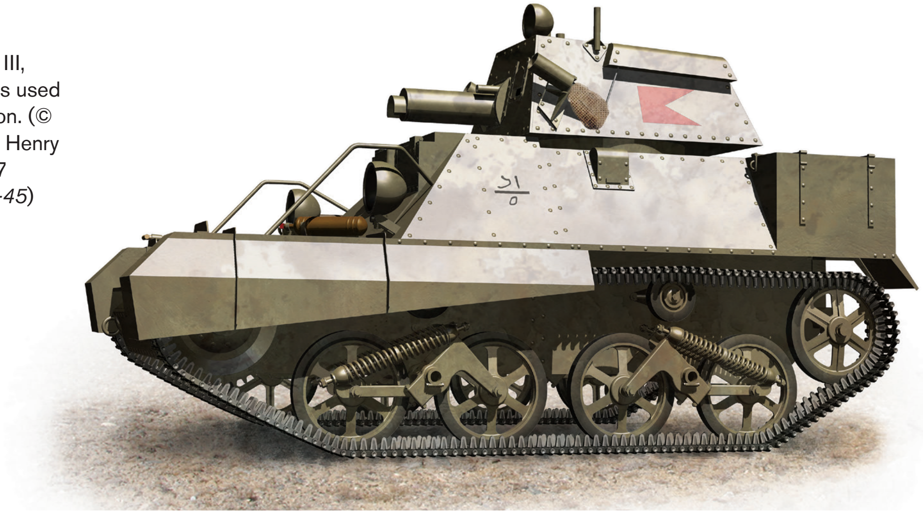
The decision to arm the A-9, A-10, A-12 and A-13 tanks with the new 2-pdr gun (40mm) caused three major problems for the RTC. First, the weapon was just entering low-rate production in mid-1936, which restricted the number of medium tanks that could be equipped with the new weapon. In addition, the 2-pdr was also destined to equip anti-tank units in the infantry divisions, which meant competition for the few weapons available. The second major problem with the 2-pdr gun was that it led to a small turret ring on all the new tank designs, which would make it impossible to upgrade them with heavier weapons like the 6-pdr (57mm) gun. Finally, the lack of a high explosive (HE) round for the 2-pdr gun meant that its armour-piercing rounds would only really be effective against enemy tanks. One of the few technical lessons gleaned from the EMF exercises was that tanks needed a tracked fire support system, so the Mechanized Warfare Board recommended that some of the new medium tanks should be outfitted with a howitzer to fire HE and smoke rounds. Thus, 36 A-9 and A-10 tanks would be built as Close Support (CS) versions, equipped with an obsolescent 3.7-inch (94mm) howitzer, while the A-12 CS version would receive a 3-inch (76mm) howitzer. However, the CS tanks were too few in number and their howitzers too short-ranged to provide effective fire support to British tanks in a mobile action – a critical deficiency that was not obvious prior to the outbreak of war.

Table 1: British Tank Programmes, 1934–1940[42]

	A-9 Cruiser Mk I	A-10 Cruiser Mk II	A-11 Infantry Mk I	A-12 Infantry Mk II Matilda	A-13 Cruiser Mk III	A-13 Cruiser Mk IV	Infantry Mk III Valentine
Requirement	June 1934	1935	Late 1935	September 1936	November 1936	Early 1939	April 1939
Developer	Vickers	Vickers	Vickers	Royal Arsenal Woolwich	Nuffield Mechanization and Aero Ltd		Vickers
1st prototype	July 1936	July 1937	September 1936	April 1938	October 1937		April 1940
Orders	August 1937: 121	July 1938: 170	1937: 60 1938: 60 1939: 19	June 1938: 180	January 1938: 65	January 1939: 270	July 1939: 300
Cost	£12,710	£12,950	£6,000	£18,000	£12,000	£13,800	£14,900
Production begins	January 1939	December 1939	Early 1939	September 1939	April 1939	August 1939	June 1940
Manufacturers	Elswick Works Harland & Wolff	BRCW MCCW; Vickers	Vickers	Vulcan Foundry Ruston & Hornsby Ltd John Fowler & Co. Harland & Wolff Ltd LMSR NBL	Nuffield Mechanization and Aero Ltd		MCCW BRCW

While Peck, Elles and others were striving to get new tanks into production, Hobart was trying to put a spoke in the wheel of the British Army's decision to mechanize the cavalry. When he learned that the War Office had decided to convert more cavalry regiments, Hobart wrote a strident memorandum in February 1935, which opposed the mechanization of the cavalry and stated that only the RTC should operate AFVs. Furthermore, Hobart and other armour officers made churlish remarks about their unwillingness to incorporate cavalry officers into the RTC.[43] Instead, Hobart argued that the cavalry should simply be abolished and the savings used to create additional battalions for the RTC. Obviously, this kind of attitude went over poorly and hurt, rather than promoted, the interests of developing armoured units in the British Army. Nevertheless, the War Ministry ordered more cavalry units to begin converting to mechanized units in 1935 and 1936, although the limited number of armoured vehicles available greatly hindered this effort.

As the arguments over mechanization continued, the emergence of the Abyssinian Crisis in October 1935 provided the British Army with a unique opportunity to test its ability to operate a mechanized force in a desert



The British Light Tank Mk. III, sent to Egypt in 1935, was used to equip the Mobile Division. (© Osprey Publishing Ltd, by Henry Morshead. From NVG 217 *British Light Tanks 1927–45*)

environment. When Italy invaded Abyssinia (Ethiopia, Britain's political leadership became concerned that Mussolini might consider some desperate military action against Egypt in response to economic sanctions. At the outset, the British Army in Egypt concentrated a reinforced brigade at Mersah Matruh, but decided to deploy a mobile covering force to screen the border area near Sidi Barrani. The only mechanized forces at hand were the 6th Battalion RTC (formed in Egypt in 1933 with about 20 Mk III light tanks, 4 Mk II medium tanks and 4 Carden-Loyd tankettes; the 7th Hussars with a few light tanks, the 11th Hussars with about 30 armoured cars and the 8th Hussars mounted in trucks.[44] In December 1935, the War Office decided to reinforce the mobile force with additional troops and equipment from the United Kingdom; Hobart's brigade sent its 1st (Light) Battalion RTC, equipped with 33 Mk III and IV light tanks and a small number of the latest Mk V. By the time that reinforcements arrived, the British Army had committed about 60 of its 142 available light tanks to the Egyptian show of force. Hobart accompanied the battalion to Egypt in early 1936 as an advisor, but he assigned Colonel Vyvyan Pope to command the mobile force. Although the Italians never crossed the border, the mobile force conducted invaluable desert training, with some tanks travelling up to 800 kilometres over the course of several months. The level of mechanical breakdown was high, particularly among the tanks sent directly from the United Kingdom, which lacked tropicalized air filters. Although some wags referred to Pope's formation as the 'immobile farce', in fact the light tanks performed fairly well in the desert.[45] Once the crisis abated, the 1st (Light) Battalion returned to the United Kingdom in November 1936 and the mobile force disbanded, but the War Office decided that there was a need for a permanent mechanized brigade in Egypt as soon as sufficient AFVs were available.

By the time that Hobart returned to England in the summer of 1936, Vickers was just beginning production of the improved three-man crew Mk VIa light tank, armed with a 12.7mm heavy machine-gun and a 7.7mm coaxial machine-gun. The Mk VI possessed excellent mobility, being able to advance at speeds up to 20kph cross-country or 40kph on roads, but it only had a maximum of 14mm armour protection. Nevertheless, the Director of Mechanization, Major-General Alexander E. Davidson, stated that he was satisfied that the new tank was 'bullet resistant', which set a very low standard. The Mk VIa and the follow-on Mk VIb tanks were optimized for colonial warfare in places like India and the Middle East, not against an opponent that might possess medium tanks or anti-tank guns. Since Vickers could manufacture up to about 200 Mk VI tanks per year, the War Office believed that the remaining cavalry regiments could be re-equipped by 1938.

In May 1936, Field Marshall Cyril Deverell became the new CIGS and continued his predecessor's policies in regard to accelerated mechanization efforts. When Deverell took over, the British Army still had 13,000 horses and it was spending as much on new remounts as it was on new tank prototypes. Deverell intended to change that and wanted to start converting the remaining cavalry regiments. In November 1936, the Mechanization Board in the War Office presented a new tank programme, based upon the DRC's recommendations for a modern five-division field force. Altogether, the programme recommended 192 cruiser tanks for the four existing RTC battalions, 160 infantry tanks for the four planned independent tank battalions and 580 light tanks to mechanize ten cavalry regiments. The DRC estimated that it would cost about £25 million to outfit the Field Force, with roughly £9 million going toward the tank programme.[46] However, Neville Chamberlain, as Chancellor of the Exchequer in Stanley Baldwin's cabinet, rejected the tank programme. Chamberlain was concerned that providing the British Army with more and better tanks would encourage continental commitments, which he was eager to avoid. Instead, Chamberlain recommended that the army invest any budget increases in anti-aircraft and coastal defences. Based upon his recommendations, the Treasury only approved funds for the limited production of light tanks. As a result of Chamberlain's decision, Deverell's plan to mechanize the remainder of the cavalry got off to a very poor start. Due to the shortage of light tanks, most cavalry regiments had to make do with substitutes, such as Morris CS8 15cwt trucks, for much of 1937 and 1938.

The situation for Britain's armoured forces became even more dire in May 1937, when Chamberlain replaced Baldwin as prime minister. Chamberlain was committed to a policy of appeasement and avoiding military action at any cost. He appointed Leslie Hore-Belisha to become secretary of state for war – a politician who had chosen Liddell Hart to be his personal advisor on military matters. By this point, Liddell Hart, now working as military correspondent for the *Times,* had begun to advocate the concept of 'limited liability', which argued that Britain should not develop large expeditionary armies, which might encourage the kind of military intervention that occurred in 1914.[47] Hart claimed that the French Maginot Line could stop any German invasion without help from the British Army and that defence was now the ascendant form of warfare, which precluded armoured forces from achieving decisive breakthroughs. As a result, Hore-Belisha had a remit from Chamberlain – egged on by Hart – to limit spending on the army, particularly on tanks or the field force recommended by the General Staff. However, the fact that Germany had created three Panzer divisions in 1935 and the French already had two DLMs required some kind of face-saving gesture by politicians intent on limiting the army to little more than an imperial constabulary.

In October 1937, Hore-Belisha allowed Field Marshall Deverell to begin forming a permanent mobile division, consisting of the tank brigade, two mechanized/motorized cavalry brigades and a support group (two infantry battalions, two artillery regiments). Hart wanted Hobart to command the division, but his vocal opposition to the integration of mechanized cavalry into the division made this impossible. Instead, Major General Alan Brooke, an artilleryman with no experience with mechanized forces, was temporarily put in charge of the division. Although the War Office touted the Mobile Division as a force with over 600 vehicles, it actually had only the obsolete Mk II medium tanks and the early model light tanks. Essentially, the Mobile Division was a training formation with the RTC providing the instructors and resources for the cavalry units to convert, but it was never a combat-capable unit. Indeed, the RTC's training depot at Bovington was inundated with cavalry-enlisted soldiers who needed driver training and officers who needed familiarization training on armoured vehicles. In December 1937, the emptiness of the Mobile Division effort was revealed when the British cabinet openly endorsed the 'limited liability' concept and specifically mentioned cutting most of the funds earmarked for the army's tank programme.[48] Field Marshall Deverell and Elles both tried to oppose Hore-Belisha's policy, but both men were sacked, leaving the army's mechanization plans in complete disarray.

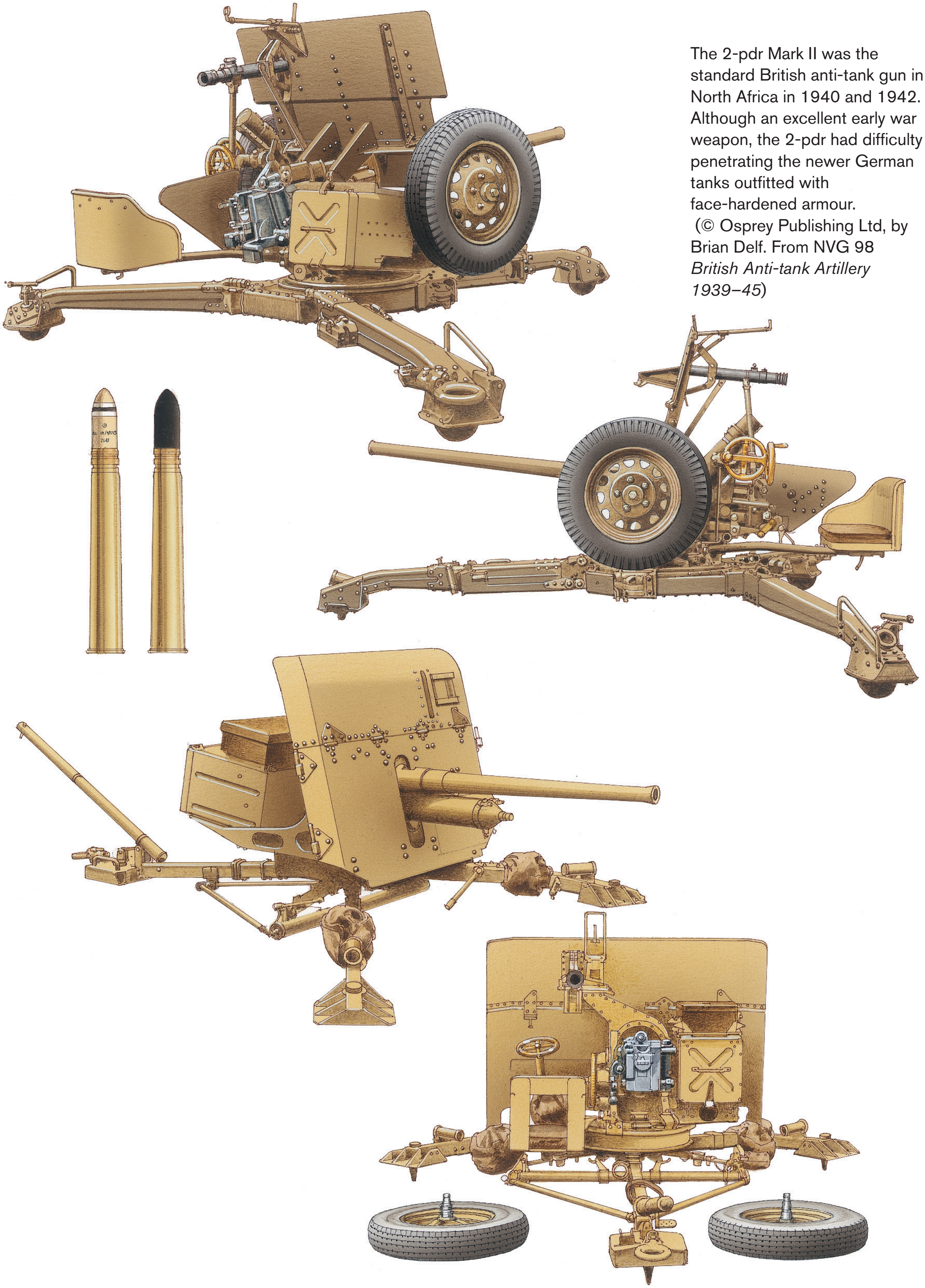
The British armoured force fell further and further behind in 1938, with no cruiser or infantry tanks produced that year. Training in the Mobile Division was hamstrung by lack of resources and Brooke left after only nine months in titular command; he was replaced by Major General Roger Evans, a cavalryman. The Mobile Division was re-designated as the 1st Armoured Division, but it was little more than a training command, equipped with perhaps 100 light tanks. Most of the British pre-war tankers who later served in the desert started their training at Bovington Camp in Dorset, home of the RTC's regimental depot. Interestingly, less than half the 36-week training period for new tankers was actually hands-on training, with large blocks of time allocated for individual drill and sports such as boxing. Thirteen weeks were devoted to driver training and maintenance. A tank gunnery range was established at Lulworth Camp, near Bovington, where crews spent six weeks firing on obsolete Medium Mk II and light tanks (which meant the emphasis was on machine-gun firing).[49] Since very few tanks were available with the new 2-pdr gun until the start of the war, British pre-war armour training was considerably impaired.

The only positive development for Britain's armoured forces in 1938 was the creation of the Mobile Force in Egypt, under the command of Hobart. However, Hobart's rump division consisted of only two tank battalions, two mechanized cavalry regiments and a minimum of support units. In April 1939, Hore-Belisha announced a major structural change for British armoured forces, with the creation of the Royal Armoured Corps (RAC). The RAC would include both the RTC (now re-designated as the Royal Tank Regiment) and the mechanized cavalry regiments.[50] As a result, the tankers and cavalrymen would merge training resources, but the regiments would still maintain their distinct cultures – which meant two different styles of operating on the battlefield.

By the time that the RAC was created, the War Ministry finally received the funds which had been withheld for so long, but the industrial base was too small to ramp up tank production overnight. Instead, more firms were enlisted to manufacture tanks, but it would take the better part of a year before they could begin serial production. In January 1939, the first A-9 Cruiser Mk I tanks rolled off the assembly line, yet only 76 had been completed when Britain declared war on Germany in September 1939. The A-9 was quickly recognized as unsuitable for use in Europe and the decision was made to send about half of them to Egypt. Likewise, 67 A-11 infantry tanks had been completed by the start of the war, enough to equip one battalion (4 RTR), but were recognized as unsatisfactory as well. A total of 43 A-13 tanks had been built, but many were not yet armed.[51] In a frantic scramble, the War Office was able to rush the A-10, A-12 and A-13 into limited production, but during the entire Phoney War period of September 1939–April 1940, Britain only built a total of 532 tanks, half of which were Mk VIb light tanks. In contrast, France built 969 tanks in the same period and Germany built 648.

The A-12 infantry tank Mk II (later dubbed the Matilda II) was a promising tank, but production difficulties had caused the project to slip behind schedule and few would be available before late 1940. On their own initiative, Vickers had offered in 1938 to produce a cheaper, simpler infantry tank, based on its own A-10 chassis. At first the War Ministry demurred, but by July 1939 the urgent need to get gun-armed tanks to the army led to a contract for 275 Infantry Tank Mk III from Vickers, which became the Valentine tank.[52] The willingness of the War Ministry to add yet another tank model into the British Army's armoured force structure – without even requiring a prototype for evaluation – indicates something of the frenzied nature of this period, with hostilities imminent.

When the British Expeditionary Force (BEF) arrived in France in 1939, the French General Maurice Gamelin was astonished to see that the British armoured units had no gun-armed tanks and that many of the trucks were impressed civilian vehicles. The French could not understand how the British Army, pioneers in the development of tanks, did not possess a single armoured division ready for deployment at the outset of the war.[53] Major-General Frederick Elliot Hotblack, a veteran tanker from the RTC in the First World War and assigned

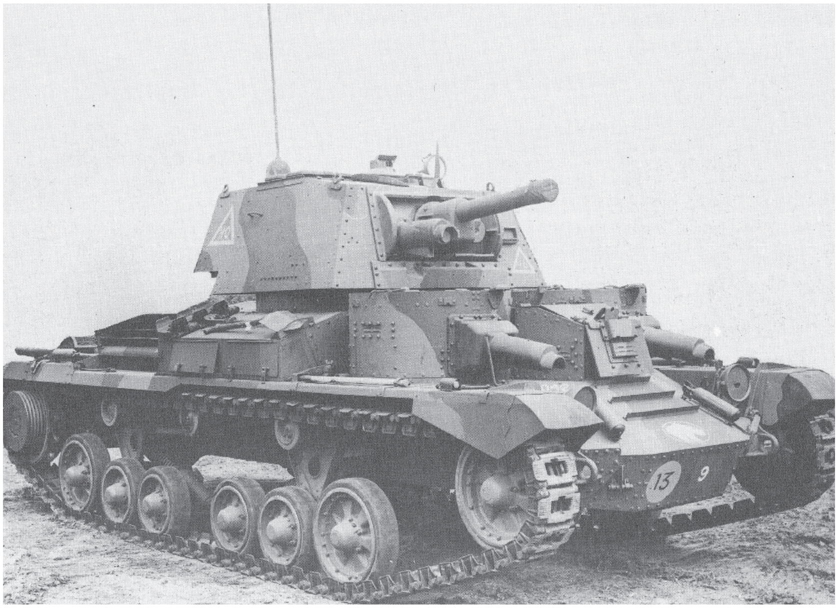


The 2-pdr Mark II was the standard British anti-tank gun in North Africa in 1940 and 1942. Although an excellent early war weapon, the 2-pdr had difficulty penetrating the newer German tanks outfitted with face-hardened armour. (© Osprey Publishing Ltd, by Brian Delf. From NVG 98 *British Anti-tank Artillery 1939–45*) as an armour advisor to the BEF, knew first-hand from his experience as military attaché in Berlin in 1935–36 that the German Panzerwaffe was doctrinally better prepared for mobile warfare. In November 1940, Hotblack urged the BEF's leadership to create an armoured corps headquarters to control the two regular army armoured divisions being outfitted in the UK – but he was ignored.[54] Although given command of the 2nd Armoured Division forming in England, Hotblack suffered a stroke in April 1940 and was retired from the service. The idea of massing British armoured divisions under one corps headquarters would not became reality until mid-1942.

Amazingly, the 1st Armoured Division was assigned a very low priority for equipment and was still not ready eight months after the war began. Indeed, most of the divisional support group was stripped and sent to other assignments, leaving a tank-heavy formation. When Liddell Hart's prognostications about the ability of the French defences to stop German armour proved utterly false, the 1st Armoured Division was hurriedly sent to France and then committed willy-nilly into battle at Abbeville against one German infantry division. Indeed, the A-10 CS tanks were not provided with either smoke or HE rounds for their howitzers and many of the tank radios were not working. Attacking under cover of a morning fog which limited their visibility, the thinly armoured cruiser tanks advanced at full-tilt into a screen of concealed German 3.7cm anti-tank guns, which inflicted heavy losses. Lacking HE rounds, the 2-pdr guns proved ineffective at suppressing anti-tank positions. In its first action, the British 1st Armoured Division lost 120 of 180 tanks engaged and failed to accomplish its mission. In just three weeks of fighting in Belgium and France, the British Army lost the majority of its tank force, totalling 722 tanks of all types (including 126 infantry tanks, 189 cruiser tanks and 407 light tanks).

In sum, Britain went to war in 1939 with an armoured force that was ill-equipped, ill-organized and ill-trained to conduct mobile combined arms warfare. Essentially, British tanks were designed to fight in two different combat environments: in an infantry support role and in a manoeuvre role. The infantry (I) tanks, cruisers and light tanks were not complementary and the over-reliance on the 2-pdr gun was a serious mistake. Due to the shortage of suitable tanks and the nature of summer field exercises, pre-war armoured doctrine had not been validated under realistic conditions; in particular, the capability of anti-tank guns to stop armour was underestimated. Nor were units properly configured for combined arms warfare, due to the RTC's ingrained 'tank pure' mindset and the cavalry's incomplete mechanization. However, overall blame for the unpreparedness of British armour has to be laid at the feet of Britain's senior political leadership in the 1930s, who chose to neglect the army in favour of ill-considered appeasement policies and fiscal parsimony.

Yet even if the British Army had been able to develop better tanks and had the necessary funds to outfit one or more armoured divisions prior to September 1939, the lack of reliable close air support seriously compromised its ability to conduct effective combined arms operations against a peer enemy. Despite the money lavished on the Royal Air Force in the 1930s, its leadership



Since the 2-pdr gun was not provided with an adequate HE shell, the British developed close support (CS) variants for most of their early war tanks. Here, an A-9CS tank is armed with a 94mm howitzer, which could fire either HE or smoke rounds. In practice, the handful of available CS tanks rarely played any substantial role in combat. (Author's Collection)

was fixated on building up Bomber Command and Fighter Command, in order to enhance its prestige as an independent service. RAF doctrinal manuals issued in 1925 and 1935 paid lip service to the army cooperation role, but the leadership committed only minimal resources to this mission. Indeed, the RAF leadership stated their preference was to use aircraft only to attack targets beyond the range of artillery, which essentially abandoned any pretence of providing close air support.[55] Although the Air Ministry issued requirements for a new light bomber in 1934 and for a dive-bomber in 1935, these programmes did not lead to aircraft that were suitable to provide close air support to mechanized formations. The Fairey Battle proved to be a disappointing light bomber with limited firepower and survivability, while the RAF leadership decided they did not need a dive-bomber and relegated the Hawker Henley to auxiliary duties. Nor was any joint air-ground doctrine developed with the Army prior to the outbreak of the Second World War. It was not until the last months of the North African campaign that the RAF began to field the kind of aircraft and tactical organizations necessary to properly support the army on the battlefield.

After the First World War, every major army recognized that a combined arms approach was an essential requirement for success in modern warfare. Multiple doctrinal documents and professional military articles were produced in the inter-war period, affirming the validity of combined arms methods. Yet in order to arrive at a combined arms outcome on the battlefield, an army has to bake this mindset into its organizational structures and pre-war training. However, the British Army did not do this in the 1930s. Instead, armour became a niche speciality in the British Army, with which very few senior officers had more than superficial familiarity.

GERMANY ASSEMBLES A COMBINED ARMS TEAM

"Neither of us will ever see German tanks in operation in our lifetime."[56]

Generalmajor Otto von Stülpnagel to Major Heinz Guderian, 1931

While Britain, France and the United States were struggling to develop the precepts of armoured warfare, Germany was secretly and aggressively pursuing its own experiments in mechanization. Although the Treaty of Versailles forbade post-war Germany from possessing tanks, the newly formed Reichswehr found a few loopholes, such as the June 1922 Boulogne Note, in which the Allies allowed German security police to acquire 150 armoured cars. In fact, the police promptly handed over 100 of the new Daimler-Benz Kfz 13 armoured cars to the Reichswehr. Likewise, the Boulogne Note allowed Germany to build a small number of armoured troop carriers.[57] Nevertheless, the Allies made it difficult for the Germans to develop or manufacture new weapons in Germany. The Inter-Allied Military Control Commission remained until February 1927 and forced armaments manufacturers like Krupp and Rheinmetall to dismantle plants and sell off machine tools, leaving the German defence industrial base in a much-reduced state.[58]

General Hans von Seeckt, commander of the post-war Reichsheer (the army component in the Reichswehr) from 1920 to 1926, regarded the deadlocked positional warfare of the First World War as anathema and concluded that mobility was an essential element in modern warfare. He directed intense professional studies on the lessons learned from the First World War, which identified the Allied material superiority in tanks and tactical air support as key factors leading to Imperial Germany's defeat on the battlefield in 1918.[59] Von Seeckt sought to create a professional army which could conduct manoeuvre warfare (*Bewegungskrieg*) in order to achieve quick victories in any future conflict. Consequently, von Seeckt ordered the covert development of both tanks and aircraft, even though these weapons were outlawed by the Treaty of Versailles. For the sake of security, the development of armoured vehicles was kept in the hands of a small technocratic group of military professionals from various branches, who were assigned to the Truppenamt (Troop Office). Although there was some opposition to the development of tanks – mostly from traditionalists in the cavalry branch who regarded tanks as unreliable – von Seeckt's imprimatur ensured that the programme would proceed.[60] Funds for research and development were very limited, but the civilian leadership in the Weimar Republic did not interfere with von Seeckt's rearmament initiatives.

Unlike the Allies, the Reichswehr was not tied to supporting any existing operational requirements, such as defending colonies, and was free to experiment with various concepts and tank designs. German officers were attentive to British, French and American tank developments, but they were not in thrall to them. Fritz Heigl (1895–1930), an Austrian officer with a background in engineering, was a frequent contributor to the *Militär Wochenblatt* (Military Weekly) in the 1920s and he kept German readers well-informed on the new Vickers medium tanks and later the Christie tanks. By 1927, Heigl was raising the idea of tank units with supporting mechanized infantry and artillery.[61] Works by both Fuller and Liddell Hart were translated into German, but most of the Reichsheer's thinking about tanks came from within their own ranks. Much later, Erwin Rommel revealed that he had not even read anything by Liddell Hart until June 1942.[62] One of the most important voices promoting tanks in the Reichswehr belonged to Leutnant Ernst Volckheim, who had commanded an A7V tank in combat in 1918; he wrote extensively about the use of tanks, in publications such as *Der Kampfwagen in der heutigen Kriegführung* (*Tanks in Today's Warfare*) and *Kampfwagenverwendung im Bewegungskrieg* (*The Use of Tanks in Manoeuvre Warfare*) in 1924. Volckheim advocated the development of faster, better-armed and better-protected tanks, since he saw little point in trying to develop doctrine for tanks which did not exist.[63] By 1927, Volckheim was editor of the *Militär Wochenblatt* and his professional assessments – which were based on hands-on experience – carried far more weight in the Reichsheer than Liddell Hart's amateur opinions. Although Volckheim initially favoured the use of tanks in the infantry support role, he envisioned that improved tanks would eventually be capable of operating as an independent force. One particularly colourful early tank advocate was Wilhelm Brandt, who held a doctorate in engineering and went to Bolivia during the Chaco War in 1932–33. Brandt was given command of the Bolivian armoured unit, consisting of Vickers E tanks, which he led in combat. Returning to Germany, Brandt wrote extensively about his first-hand experiences with armoured warfare, revealing that the thin armour plating on the Vickers tanks were vulnerable to armour-piercing bullets.[64]

The Reichsheer concealed its tank development programme within the Heereswaffenamt (HWA), the ministry responsible for military research and development, as well as several front companies. Within the HWA, the chief engineer Heinrich Ernst Kniepkamp from the Waffenprüfamt 6 (Wa Prüf 6) department was responsible for developing armoured vehicle requirements. The Reichswehr could not begin even limited rearmament efforts until after the French Army of Occupation left the Ruhr in 1925 and could then only proceed cautiously and on a small scale. Germany's defence spending was only about one-third of Britain's, and only ten percent or less could be culled from the official budget to work on secret projects.[65] Consequently, the initial priority was on low-key programmes, such as developing the 3.7cm anti-tank gun and the 7.5cm infantry gun.

As with other armies of the period, the Reichsheer initially wanted an infantry support tank. In May 1925, the HWA wrote the requirement for a

Panzer training with a mixed group of Pz I and Pz II tanks at Wünsdorf, 1938. The *Schirrmeister* (i.e. motor sergeant) uses a whistle and hand signals to direct trainee tank commanders. The Wehrmacht put maximum effort into raising and training Panzer units in the lead-up to war. (SDZ, 00108136)

16-ton medium tank, equipped with a 7.5cm KwK L/24 howitzer in a fully rotating turret. A year later, this requirement was formalized as 'Armeewagen 20', which led to contracts being issued to Daimler-Benz, Krupp and Rheinmetall; each was to build two prototypes. Construction of these six medium tank prototypes, designated as the Grosstraktor, began in 1928 and all six were completed by July 1929. After further thought, in 1928 the Reichsheer leadership decided that a light tank would also be useful, so the HWA developed a requirement for an 8-ton light tank equipped with a 3.7cm gun. Both Krupp and Rheinmetall contracted to build two prototypes of the Leichttraktor, which were completed in May 1930.[66] Since the Reichsheer could not yet test tanks in Germany, von Seeckt arranged to establish a covert facility in the Soviet Union, part of the secret military collaboration begun after the 1923 Treaty of Rapallo. Oberst Oswald Lutz, an engineer officer with experience in commanding motor transport units, was put in charge of setting up the secret tank training school. In March 1929, Panzerschule Kama (the Soviet designation was TEKO), located near Kazan, became operational.

The first German-built tanks arrived at Kama in July 1929. Since only about ten German officers attended each annual course at the school, there were too few personnel at Kama to conduct collective unit-level training. Rather, Kama functioned as a testbed, enabling hands-on training on modern tanks to educate a cadre of Reichsheer officers, as well as providing engineers from German armaments firms the ability to field-test their latest vehicle designs. In the classrooms, German officers began to develop plans for future Panzer (tank) units, including a notional battalion-size organization. Volckheim was eventually sent to Kama as an instructor, where he was able to update his theories on modern armoured vehicles. Although neither the Grosstraktor nor Leichttrakor designs proved practical, they were clearly antecedents of the Pz III and Pz IV medium tanks of the Second World War. The primary importance of Panzerschule Kama was that it allowed the Reichswehr to gain insight into operating relatively modern tanks; prior to Kama, tanks were mostly theoretical.

At the time that Panzerschule Kama was organized, the prospects for the Reichscheer acquiring any kind of substantial armoured force did not seem promising. The German economy was in virtual freefall in 1929 and 1930 due to the Global Depression and there was barely money available for even modest military research programmes. Generaloberst Wilhelm Heye, who took over as commander of the Reichsheer in 1926, was sympathetic to the development of tanks and even attended the EMF's manoeuvres at Tidworth. After seeing British tanks in exercises, Heye concluded that 'modern tanks, in cooperation with mobile forces or in independent units, are in a position to carry out missions with far-flung objectives, against the flanks and rear of the enemy, and also to fight quickly and succcessfully and at the battle's decisive point'.[67] However, Heye had no money to spend on tanks and German tank development came to a virtual standstill by the time he retired in 1930. Heye was followed by General der Infanterie Kurt von Hammerstein-Equord, who characterized Panzerschule Kama as a 'pact with the devil' and decided to stop sending additional students to the Soviet Union.[68] Instead, he decided that it was now safe to conduct low-key armoured experiments on German soil, as long as they were kept out of sight. Hammerstein-Equord also brought a more conservative outlook to doctrinal discussions, emphasizing anti-tank defence rather than offensive action.[69]

Experience gained at Kama suggested that smaller, cheaper vehicles than the Grosstraktor would suffice for providing the Reichswehr with training troops in handling tracked armoured vehicles. Furthermore, the Grosstraktor and Leichttraktor prototypes were essentially hand-built vehicles, ill-suited to mass production. Given the reduced state of the German defence industrial base in 1931, the HWA recognized the need to start with simple designs and then build upon them, as technical capabilities improved. As a first step, Wa Prüf 6 began working with Krupp in 1930–31 to develop a new tracked artillery tractor, which was assigned the cover name of Landwirtschaftliche Schlepper or La.S

A platoon of German Pz II light tanks in training at Wünsdorf, 1938. Note that the 2cm guns are oriented left and right to cover both sides of the road and that the commanders are operating 'buttoned up'. (SDZ, 00108157)

(agricultural tractor). The HWA needed a site to quietly test and evaluate new armoured vehicles and a facility was established at the artillery range at Kummersdorf, 40 kilometres south of Berlin. Through the use of a front company, the HWA was able to covertly purchase three Carden-Loyd artillery tractors from Vickers; the first of these British-built tracked vehicles arrived at Kummersdorf in January 1932. Under Heinrich Kniepkamp's direction, Wa Prüf 6 examined the British vehicle and used its suspension as a model to upgrade Krupp's tractor design. The first Krupp Kleinetraktor was ready by July 1932 and testing indicated that the 3.5-ton vehicle was capable of speeds up to 42kph. Although the Kleinetraktor was a turretless, unarmed vehicle, the German army wasted no time in seeking to develop an armed version and to increase its armoured protection.

Generalmajor Lutz, now in charge of the army's motorization programme, wanted to escalate the Kleinetraktor from a test bed to a viable light tank as soon as funds were available. He also took steps to create the embryo of a motor-mechanized force, based upon two of his motor transport battalions. Oberst Ernst Feßmann, a cavalry officer who had attended Panzerschule Kama, was made commander of the Kraftfahrlehrkommando (Motor Vehicle Training Command) at Zossen. This innocuous-sounding command was in fact the seed corn for Germany's Panzertruppe and its early members including a number of officers, such as Walter Nehring and Werner Mildebrath, who would figure prominently in the North African campaigns in 1941–43.[70] Hitler's appointment as Reichskanzler in January 1933 did not immediately change the situation for Lutz's fledgling motorized force, since no tanks were available and funds were still tight. Furthermore, Hitler made clear that he wanted the initial stages of rearmament to remain secret to avoid foreign interference. The situation changed on 8 June 1933, when Hitler's regime approved 35 billion Reichsmarks (RM) to be spent on rearmament over the next eight years, resulting in a six-fold increase in military spending per annum. Since no large infusion of money was available, Hitler's cabinet authorized armaments contracts to be paid for with *Verpflichtungsscheine* (certificates of obligation, i.e. promissory notes) – the Panzerwaffe would be bought on credit.[71] At a stroke, Hitler had made rapid rearmament possible by the simple expedient of ignoring financial constraints. Now the difficult part was getting German industry to turn out quality armoured fighting vehicles in quantity.

In January 1934, Lutz met with officials of the HWA to discuss the army's requirements for AFVs. First, he requested that the HWA initiate production contracts for armed versions of the upgraded Krupp Kleinetraktor, which would be brought into service as the Pz I light tank. Second, he outlined the need for two different types of medium tanks. Oberstleutnant Heinz Guderian, Lutz's deputy, had worked out the details, based on lessons learned from Panzerschule Kama and analysis of likely future mission requirements. The first tank, designated as the Zugführerwagen or Z.W. (platoon leader's vehicle), was envisioned as a 15-ton vehicle armed with a short 3.7cm gun. The second tank, designated as the Begleitwagen or B.W. (escort vehicle), was envisioned as an 18-ton vehicle armed with a short 7.5cm howitzer. As Guderian explained, the Z.W. (which would become the Pz III) would be the army's primary medium tank, while the B.W. (which would become the Pz IV) would be a support tank. Rather than trying to build a universal tank that could accomplish all missions equally well, Lutz, Guderian and the HWA advocated two different but complementary designs that were intended to work together. Soon thereafter, the HWA asked Krupp, Daimler-Benz and Rheinmetall to begin working on developing prototypes for the new tanks.

Table 2: German Tank Programmes, 1932–39

	Pz I	Pz II	Pz III	Pz IV
Requirement	June 1932	January 1934	January 1934	January 1934
Developer	Krupp	MAN Daimler-Benz	Krupp Daimler-Benz	Krupp Rheinmetall
1st prototype	January 1934	October 1935	August 1935	April 1936
Orders	1933: 150 1934: 850 1935: 150	1935: 75 1936: 600 1937: 400	1936: 5 1937: 40 1938: 110	1936: 35 1937: 182 1938: 248
Cost	RM 38,000 £2,800	RM 52,640 £4,300	RM 96, 163 £7,850	RM 103,500 £8,450
Production begins	October 1934	April 1936	March 1937	November 1937
Manufacturers	Krupp Daimler-Benz Henschel MAN Rheinmetall	Alkett Daimler-Benz MAN FAMO Henschel MIAG Wegmann	Daimler-Benz Henschel MAN Alkett FAMO	Krupp

Despite its modest capabilities, production of the Pz I tank proved a milestone in the development of Germany's Panzerwaffe (armoured force). Unlike the British Army in the early 1930s, who retarded the development of their tank production base by placing only small orders with a single firm, the HWA placed large production orders for the new tank with Krupp, Daimer-Benz, Henschel and MAN. While only 54 Pz I tanks were built by the end of 1934, they were soon followed by 851 in 1935 and 557 in 1936. Ensured of larger follow-on orders for improved tanks, German industry invested in new machine tools, skilled workers and assembly facilities. As soon as the first Pz I Ausf A tanks rolled off the production line, the first batch was issued to Kraftfahrlehrkommando Zossen to begin driver training.[72] It quickly became apparent that the Pz I Ausf A was under-powered, so the HWA quickly approved an upgraded vehicle with the 100-horsepower Mayback NL38 TR 6-cylinder engine to replace the 57-horsepower Krupp M 305 4-cylinder engine. Rapid identification of technical flaws followed up by improved versions became a strong suit in early war German tank design, although ultimately the continuous diversion from standardization negatively impacted mass production.

At some point in 1934 – the date is not clear – Oberstleutnant Guderian formed a mixed demonstration unit at Kummersdorf consisting of one platoon of tanks (simulated by 7 Kleinetraktor or early Pz I prototypes), two armoured car platoons (with Kraftfahrzeug 13 (Kfz. 13) and Sonderkraftfahrzeug 231

(Sd.Kfz. 231)), one motorized Panzerjäger platoon with towed 3.7cm anti-tank guns and one platoon of armed motorcycles. Hitler visited Kummersdorf to examine new weapons and Guderian was given 30 minutes to demonstrate his mixed combat group on parade ground manoeuvres. According to Guderian, Hitler was very enthusiastic about this display and said, 'That's what I want! That's what I want to have!'[73] It is important to remember that Hitler had probably never seen tanks up close before and had no basis for comparison. Also, Hitler was easily impressed by weapons demonstrations and he actually spent most of his visit at Kummersdorf watching some of the first rocket tests; Guderian's demonstration was the *hors d'oeuvre*, not the main course. In time, Hitler supported the development and expansion of the Panzerwaffe, but he was enthusiastic about bombers and U-Boats as well. Guderian's account of the genesis of the Panzerwaffe is tainted by a self-serving agenda, which brushed aside the contributions of others to make it seem as though he was primarily responsible for creating Germany's armoured forces and doctrine. That simply was not true.

Indeed, Guderian had been a minor figure in the Truppenamt prior to 1932 and had made no original contributions to armoured warfare doctrine. Instead, it was officers like Major Walther Nehring in the Truppenamt's training office (T4) who began to spell out independent missions for armoured units, influenced by Heigl's earlier writings. Nehring wrote that, 'The essence of this [armoured] warfare is not the conduct of protracted battles, but rather the commitment to short, temporally and spatially limited operations with narrowly defined tasks'. He also recognized that tanks could advance quickly, but could not hold objectives without the direct support of motorized infantry and artillery. Two other voices were also prominent in the move toward developing German armoured warfare doctrine. Generalmajor Hermann Geyer, an infantry officer who had recently headed the Truppenamt's T1 (operations and planning) office, envisioned a new battlefield rhythm with short, powerful blows to be followed by lengthy periods of refitting – which is remarkably similar to the actual operational dynamic witnessed in North Africa in 1941–42.[74] A retired Austrian general, Ludwig Alfred von Eimannsberger, who wrote a theoretical work about armoured warfare called *Der Kampfwagenkrieg,* also influenced the developed of German armoured warfare doctrine. Heinz Guderian would eventually publish his own book, *Achtung – Panzer* (1937), by which point German armoured warfare doctrine was already solidifying around core ideas. To his credit, Guderian acknowledged he was influenced by von Eimannsberger's earlier book.

Unlike mechanization efforts in Britain and the United States, the actual creation of the first armoured forces was directed mostly by officers with technical and service support backgrounds, rather than infantry or cavalry officers. Lutz (like Hobart and Martel) came from the engineers and Guderian from the signal troops. Major Johannes Streich, who would later command the 5. Leichte Division in North Africa, had previously served with the railroad repair troops and then in the motor transport troops. Major Herbert Olbrich, who would later command Panzer-Regiment 5 (Pz.Regt. 5) in North Africa, had a doctorate in engineering and had previously served in the artillery. Of note, both Streich and Olbrich served in Wa Prüf 6 and were directly involved in designing and developing the first generation of German Panzers.

On 16 March 1935, the Reichswehr was renamed as the Wehrmacht, conscription was re-introduced and plans were announced to expand the army to 36 divisions. In July, the army announced that three of the new divisions would be armoured, which led to the formation of the 1., 2. and 3. Panzer-Divisionen on 15 October 1935. Guderian, still only an oberst, was given command of the 2. Panzer-Division; the other two divisions went to cavalry officers, although Ernst Feßman was a Kama graduate. The four motorized transport battalions and several cavalry regiments were used as the basis to form the first Panzer units, which totalled 12 Panzer battalions. The 1935 Panzer divisions were designed by tank zealots like Guderian for independent combined arms operations; each comprised a Panzer brigade with a total of four Panzer battalions (each with four light tank companies), a rifle brigade with two motorized infantry battalions, one motorcycle infantry battalion, one reconnaissance battalion, two artillery battalions and a Panzerjäger (anti-tank) battalion. The organizational command structure was cumbersome, with manoeuvre brigades controlling regiments, which controlled subordinate battalions – essentially inserting unnecessary layers of command. At the tactical level, Guderian pushed for out-size units, so tank platoons were supposed to have seven tanks and tank companies 27, meaning battalions could have up to 126 tanks. On the other hand, the supporting infantry units were quite small and the artillery support was less than provided to a standard infantry division. Outfitting all three Panzer divisions to authorized levels would require 39,000 personnel, 1,443 tanks and over 12,000 wheeled vehicles, but there were not enough to completely outfit the 1. Panzer-Division; it would take over two years to equip all three divisions. However, the German Heer (army) could now begin training openly with tanks.

Even before the Panzer divisions were formed, it was becoming clear that German industry was going to need time to experiment with the two new medium tank designs before they would be ready for mass production. Consequently, the OKH (Oberkommando des Heeres) decided to invest in an insurance policy – an upgraded light tank with better armament that could be developed without much technical risk. Daimler-Benz and MAN were able to quickly develop the 8.9-ton Pz II light tank armed with a 2cm gun and the first batch began rolling off the assembly lines in April 1936. Meanwhile, the development of the Pz III and Pz IV tanks encountered a number of technical problems, so the new Panzer divisions did not receive any gun-armed tanks until two years after they were formed. The Pz IV was gradually perfected into a very good design by early 1939, but the Pz III was plagued by suspension problems which necessitated multiple versions. On the other hand, the selection of the 250hp Maybach HL 108TR engine for the early models of both tanks proved a good choice, which ensured adequate mobility. Unlike the British Army, the German Army leadership kept their eyes on the end-goal of producing an effective medium tank, which could spearhead combined arms offensives on the battlefield. The Germans were also designing their tanks solely for the purpose of fighting a peer enemy force. In contrast, the British Army leadership allowed itself to be distracted by fads such as the tankette, then light tanks, then cruiser tanks and infantry tanks. Inexpensive tankettes and light tanks, best suited for colonial warfare, were prioritized over medium tanks. As a result, the British Army would have no effective medium tank of its own design until mid-1944.

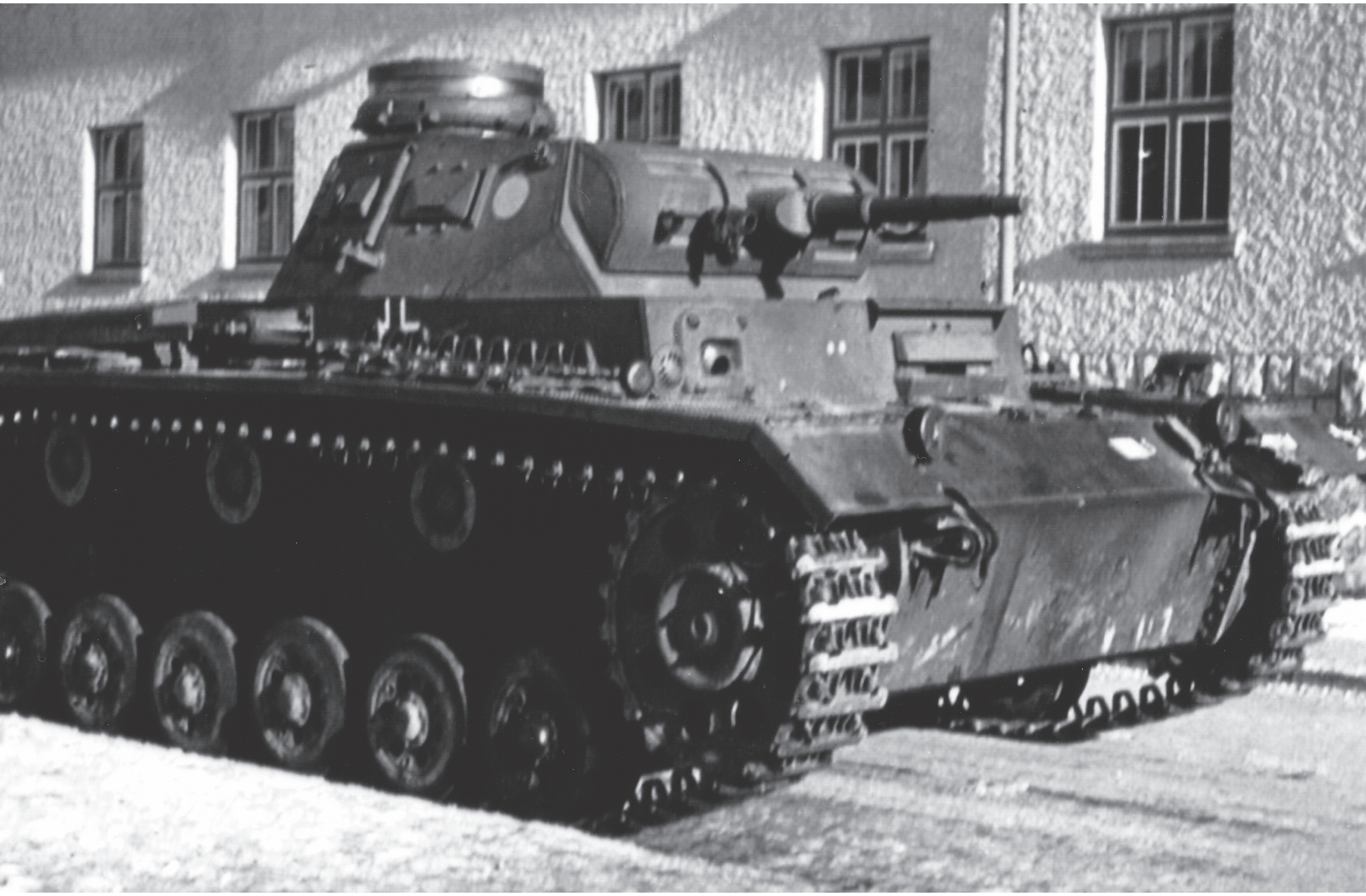
Once the tanks were out in the open and there was money to fund army expansion plans, considerable dissent arose within the upper ranks of the Wehrmacht about who would control mechanized forces and how they would be used. General der Artillerie Ludwig Beck, chief of the Großer Generalstab (General Staff), was unwilling to assign all Panzer and motorized units to Lutz's independent force and mandated that several Panzer brigades would be assigned to the infantry support role and kept under OKH control. The German cavalry arm – which was giving up personnel to help form the first Panzer divisions – also wanted its own mechanized force to perform traditional cavalry missions such as screening, delay and pursuit. Consequently, in June 1936 Beck authorized the creation of three light divisions for the cavalry, each to consist of one Panzer battalion, three motorized infantry battalions, two armoured reconnaissance battalions, two artillery battalions and one Panzerjäger battalion.[75] As a result of these decisions, the formation of the German Panzerwaffe in 1937–38 fragmented into three different types of units, each with a different role. On top of this, Beck also wanted to create Sturmartillerie (assault artillery) units with assault guns for additional infantry support, which would result in the creation of assault gun units. This fragmentation of purpose in the Panzerwaffe was not corrected prior to the outbreak of war in 1939.

In addition to the large-scale investment in tanks, the Wehrmacht invested in other weapons which enabled it to fight as a combined arms team on the battlefield. Unlike the British Army, which failed to provide its mechanized infantry with a proper armoured personnel carrier, the Germans developed the armoured Sd. Kfz. 250 halftrack to carry ten infantrymen and had it in low-rate production by 1939. The halftrack also made an excellent command vehicle. The German motorized artillery and FlaK units assigned to mechanized units were given tracked vehicles like the Sd. Kfz. 11 to tow artillery pieces, which had excellent cross-country mobility compared to trucks. The Sd. Kfz. 10 series halftracks were also used to mount 2cm Flak guns, thereby providing mobile air defence over a mechanized force. The Sd. Kfz. 9 series heavy halftracks provided an excellent capability to recover damaged tanks on the battlefield – which few other armies had even considered. Improved armoured cars like the Sd. Kfz. 222 and the Sd. Kfz. 231 added considerable punch to the German armoured reconnaissance units and enhanced tactical communications in division signal units. Taken together, prior to the war the Germans had succeeded in creating a wide variety of armoured vehicles that were tailored to specific tactical tasks, which provided an unmatched level of combat synergy against less well-equipped opponents. Furthermore, the Luftwaffe was explicitly tasked to create close air support capabilities to support mechanized units and they succeeded brilliantly with the development of the Ju-87 Stuka dive-bomber.

The Panzerwaffe underwent a rapid expansion in 1937–38 and in addition to adding new divisions, changes were made to tactical organizations. Panzer battalions were restructured with three companies (ideally one medium and two light) and a large headquarters element, which reduced authorized strength to 77 tanks. However, equipment shortages prevented the Germans from enforcing a standard organization on their Panzer divisions, which led to considerable variance between units. At the outset of the war in September 1939, the Panzerwaffe consisted of seven Panzer divisions, four light divisions and three independent Panzer battalions. Altogether, the Panzerwaffe amounted to 34 Panzer battalions with 2,859 tanks (1,026 Pz I, 1,151 Pz II, 87 Pz III, 197 Pz IV, 221 Czech-made tanks and 177 command tanks). However, the German armour was dispersed across five different corps headquarters, some intended more for infantry support than fast-moving deep-strike operations.

German armoured warfare tactics worked well in the Polish campaign in 1939, although the failure to conduct proper tactical reconnaissance led to several costly encounter battles. It was apparent that all current German tanks were vulnerable to 3.7cm anti-tank guns and improved tank models with additional armoured protection were urgently needed. German commanders learned that Panzer divisions worked best in pairs to conduct pincer attacks and that more motorized infantry was needed than originally anticipated. The four light divisions proved less effective and, after the Polish campaign, they began converting into full-fledged Panzer divisions. Logistics had proven challenging in fast-moving operations and German mechanized units found themselves running short on fuel at awkward moments. Air-ground operations were still rudimentary in Poland, with the Luftwaffe preferring to use its dive-bombers for battlefield interdiction rather than provide close air support to the Panzer units.

By the start of the western campaign in May 1940, the Germans had begun to refine their armoured doctrine and tactics, based upon lessons derived from Poland. Rather than just using tanks to create a break in the frontline as envisioned à la 1918, German doctrine now recognized that Panzer units and other support assets should be assigned to the *Schwerpunkt* (main effort) at a chosen point where they could achieve a decisive local advantage over an enemy. In Fall Gelb (Case Yellow), the Panzerwaffe employed ten Panzer divisions with a total of 35 Panzer battalions. The newest Panzer divisions did not have a Panzer brigade headquarters and possessed only two–three Panzer battalions instead of four. After further tinkering with company-level organization, the 1940 Panzer battalions averaged about 60 tanks at the start of the campaign.



A Pz III Ausf E medium tank. The Pz III was intended to be the Wehrmacht's main battle tank and by the start of the war, it was just starting serial production. Furthermore, the Pz III was continuously upgraded with improved firepower and protection, enabling it to remain competitive up to 1943. (Author's Collection)

Fall Gelb was premised upon the massed use of armour with over 1,000 tanks concentrated in Panzergruppe Kleist, tasked with creating an irresistible shock effect at the decisive point – Sedan. Generalmajor Erwin Rommel, recently given command of the 7. Panzer-Division, participated in the ensuing drive to the Channel Coast which isolated the British Expeditionary Force and the French 1e Armée in Belgium.

The British armoured counter-attack at Arras on 21 May 1940 provided great insight into the state of tactical doctrine and tank technology on both sides. The British counter-attack was a hastily improvised operation, but it was personally directed by Martel (who was commander of the 50th Infantry Division, which contributed units to the operation) and conducted by two regular armoured units, the 4 RTR and 7 RTR from Brigadier Douglas Pratt's 1st Army Tank Brigade, with a total of 88 tanks. The poor mechanical reliability of British tanks was revealed in pre-battle movements, which left 27 infantry tanks sidelined by mechanical faults. Martel divided the two armoured battalions, plus two of his supporting infantry battalions, anti-tank and artillery, into two balanced columns; the 16 available Matilda II infantry tanks were split between both columns. Tactical communications were poor between both columns, ensuring minimal cooperation. The RAF was supposed to provide air support, but this fell through. Nevertheless, the British counter-attack struck Rommel's 7. Panzer-Division by surprise and the German division was imprudently moving past Arras in very dispersed formations. At first, the British infantry tanks enjoyed great success shooting up a German motorized infantry battalion and causing local chaos. In particular, the Germans were chagrined to see their 3.7cm anti-tank rounds bouncing ineffectually off the thick armour of the British infantry tanks. However, once the Germans recovered from their initial shock, Rommel co-ordinated his artillery and 8.8cm Flak guns to halt the British armour, while Ju-87 Stukas dive-bombed the halted British columns. Both British tank battalion commanders were killed in action and the handful of Matilda II tanks were gradually picked off. There was relatively little tank versus tank combat at Arras, although the lighter German tanks suffered significant losses from the 2-pdr guns on the Matilda II.[76] After three hours of intense fighting, the British counter-attack fell apart and the survivors withdrew. Altogether, the British lost 58 of their 88 tanks, including all but two Matilda IIs; two captured Matilda II tanks were later sent to Kummersdorf for evaluation. German losses were heavy, but the BEF in Belgium had lost its only real armoured reserve.

Despite the enemy's initial numerical superiority in tanks and their possession of some superior tanks, such as the French Char B1bis and the British Matilda II, German armoured units were able to achieve all their operational objectives within six weeks. As a result of the Western Campaign, the Germans regarded their armoured doctrine as battle-proven, the essence of which was using combined arms organization to achieve a synergistic effect on the battlefield (where the sum of the whole is greater than that of the constituent parts). Speed, mass and manoeuvre, which were facilitated by near real-time communications and streamlined decision-making, were all part of this equation. Pre-war doctrinal publications like Beck's *Truppenführung* set a common base-line for German tactical leaders, although it was not exercised in a rigid manoeuvre. Although the over-used term *Auftragstaktik* (mission-oriented orders) was not explicit in German doctrine of the time, it does encompass the mission-oriented focus in German tactical decision-making and the requirement for initiative, rather than waiting for orders in uncertain situations. Thus, German armoured doctrine heading into 1941 was premised on the symbiosis of human and material factors; with well-trained leaders, German armoured units were expected to fight and win through bold actions, even when they were out-numbered or the enemy possessed technically superior weapons.

THE US ARMY'S DELAYED MECHANIZATION

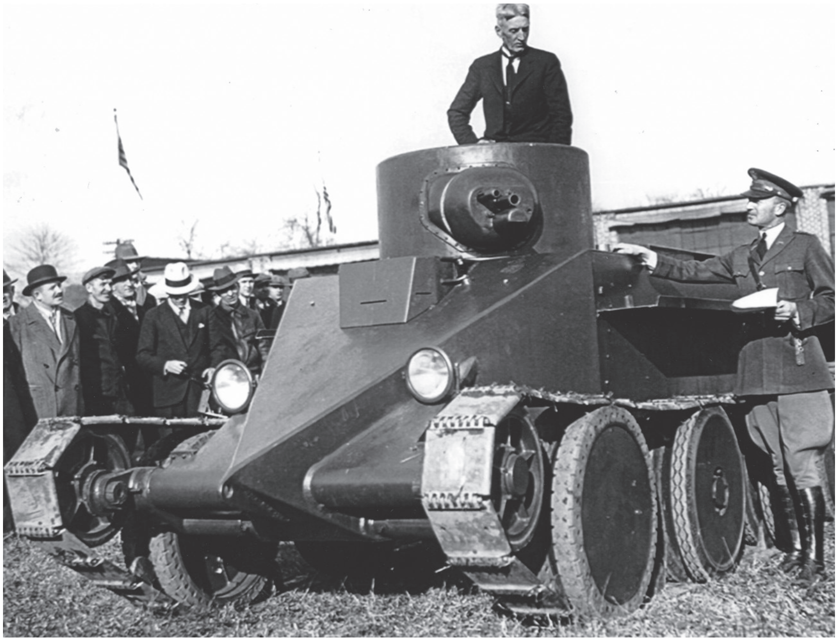
'A tank is a far cry from a horse, but I am going to the Armoured Force. I am totally ignorant on the subject, so will have plenty to do and plenty of incentive to learn.'[77]

Colonel Orlando Ward, 23 August 1941

After the end of the First World War, the US Army's Tank Corps was subordinated to the infantry branch and only three tank battalions remained in the US Army force structure for training.[78] The Tank School remained at Fort Meade, Maryland. Officers like Patton and Dwight D. Eisenhower – who were far from the mindset of the tank radicals in England – tried to use the US Army's professional journals to promote further development of tanks, but ran into a solid wall of opposition from the infantry branch. Discussions about development of any new tanks became mired in an infantry support mindset and asphyxiated by a perpetual lack of funding. Nor was Patton much impressed with either Fuller's or Hart's ideas about armour, which he considered unrealistic. Indeed, Patton referred to Hart as a 'hack writer' whose opinions were 'puerile'.[79] A frustrated Patton returned to the cavalry branch, although he kept a keen eye on armoured developments.

Instead of relying upon private industry to develop new armoured vehicles, the US Army Ordnance Department depended upon a small design team at the government-owned Rock Island Arsenal (RIA) in Illinois. In the immediate aftermath of the First World War, RIA focused on trying to develop a new medium tank. After seven years of plodding work, the project was abandoned after only a dozen test vehicles were built. By 1926, the RIA decided to shift to developing light tanks and hired a civilian automobile engineer, Harry A. Knox, to assist with the project. By 1928, Knox had perfected the 7.8-ton T1 light tank, armed with a 37mm gun and capable of speeds up to 29kph. While the T1 light tank possessed mechanical reliability, Knox's decision to mount the engine in the front of the vehicle and protect it with only 10mm of armour is the kind of mistake one could expect from a civilian designer who did not consider how a single armour-piercing bullet could immobilize his tank. The infantry branch was not much impressed with the T1, so only four T1E1 tanks were built, along with a few improved prototypes.

Although the US War Department expressed limited interest in developing tanks in the 1920s, it was prudently monitoring developments in other countries. In 1927, Dwight F. Davis, the US Secretary of War, visited England and observed the EMF exercises on Salisbury Plain. Impressed, he returned home and authorized the US Army to conduct a similar experiment in order to develop mechanized warfare doctrine.[80] Consequently, in July 1928 the US Army established a mixed brigade-size mechanized force at Fort Meade (with two tank, one infantry and one artillery battalions, plus company-size support elements);



American inventor Walter J. Christie with his M1931 tank. The Christie suspension had a major impact on both Soviet and British tank design, particularly in the development of the cruiser tank concept. (Author's Collection)

aside from the handful of new T1E1 light tanks, most of the other vehicles were obsolete, such as the 6-ton M1917 tank. Limited tactical training was conducted and after three months, this mechanized formation was disbanded. The condition of the armoured vehicles was so poor that the force commander, Colonel Oliver Eskridge, asked the War Department now to allow foreign visitors to view the manoeuvres. Although the short-lived experiment had little impact on US Army armoured doctrinal development, it did provide ample opportunity for independent tank designer, John Walter Christie, to try and sell his M1928 tank to the US Army, with the support of Major George S. Patton.[81] Christie's tank was designed around a novel suspension system with large road wheels (which could run with or without tracks), which provided superior mobility over a variety of terrain as well as a powerful 12-cylinder Liberty L-12 petrol engine, capable of delivering 449 horsepower and driving the tank at speeds up to 40 kilometres per hour. Christie drove his M1928 tank along the same route as the RIA's T1E1 tank at nearly triple the speed.[82] As a result of this demonstration, the US Army considered purchasing M1928 tanks from Christie, instead of more T1 tanks from RIA.

After disbanding the mechanized force, Davis created a Mechanization Board to study mechanization programmes for the US Army, in conjunction with the G-3 Section (Operations). In October 1928, the board recommended the establishment of a permanent mechanized force with just over 2,000 personnel. Lieutenant Colonel Adna R. Chaffee Jr, a cavalry officer working in the G-3 section, went even further and used his position on the board to advocate the creation of a separate mechanized branch.[83] With the zeal of a new convert, Chaffee's opinions shocked the more conservative infantry officers, particularly when he recommended that tank units should not be tied to the infantry. Major General Stephen A. Fuqua, chief of the infantry branch, vigorously argued that only infantrymen should be involved with deciding what tanks should be built and how they should be used, but Davis ignored his protests and approved the creation of a permanent mechanized brigade to be equipped with the latest equipment. However, due to fiscal constraints, Davis decided to put actual establishment of the unit off for two years. In the interim, Colonel James K. Parsons, head of the Tank School at Fort Meade, wrote a memorandum to the Mechanization Board, suggesting that the ultimate objective should be the creation of six armoured divisions.[84] It is worth pointing out that at this point, the majority of US armoured strength was actually in the US Army National Guard, not the regular army. Out of a total of 28 tank companies, 18 were attached as individual companies to National Guard infantry divisions and only ten were in the regular army tank units.[85] With fewer than 1,200 trained tankers, forming division-size armoured units was well beyond the reach of the inter-war regular army.

Unfortunately, any grand plans for rapid mechanization evaporated due to the Wall Street Crash in 1929 and the onset of the Great Depression, both of which severely impacted the army's budget. Instead of the $4 million recommended by Chaffee, the War Department allocated only $284,000 to create the mechanized force.[86] As a result, the mechanized formation that was established at Fort Eustis in November 1930 was far smaller than intended and consisted of only one tank company with 15 light tanks (11 M1917 and 4 T1E1), a reconnaissance troop with 11 armoured cars and one artillery battery – altogether fewer than 600 men. Laughably, the mechanized force initially was provided with some horses for its support units due to the shortage of trucks. Nor would the infantry branch provide an infantry unit to join the formation. Furthermore, technical problems encountered developing a standard tank design doomed the mechanized force. Christie was only able to sell seven of his latest tanks (for $34,500 or £7,600 each) to the US Army in June 1931, but his hand-built tanks proved fragile in service and he proved incapable of mass-producing more robust tanks.[87] Losing patience with Christie, the US Army purchased one Vickers 6-ton tank, which it used as a model to upgrade its lagging T1 light tank project into a more viable design. Yet with little money left for further purchases or testing, General Douglas MacArthur, chief of staff of the Army, decided to pull the plug in October 1931 and disbanded the mechanized force at Fort Eustis. Instead, MacArthur decided that the infantry branch could continue its low-key efforts to develop infantry support tanks while the cavalry branch was also allowed to pursue its own mechanization projects. Chaffee and his incipient mechanized cavalry force made their home at Fort Knox, Kentucky while the infantry relocated their tank school to Fort Benning, Georgia. Since the cavalry branch was not allowed to possess tanks – which were reserved for the infantry branch – the armoured fighting vehicles for the cavalry were designated as 'combat cars'. MacArthur's decision effectively split the US Army's armoured development along two diverging paths.

As a result of MacArthur's policy, the development of US armoured forces fell into a long period of stagnation between 1931 and 1937. George Dern, the new Secretary of War in President Franklin D. Roosevelt's administration, arbitrarily decided to impose a limit of 7.5 tons upon new tanks, which temporarily closed the door on any medium tank programmes. The budget for tank development by the US Army Ordnance Department for most of the decade averaged just $60,000 per year, which was enough to cover the cost of a single prototype.[88] During 1931–35, a grand total of only 16 tanks of five different models was built at the Rock Island Arsenal. However, Knox's design team made steady progress, developing rubber-bushed tank tracks and vertical volute bumper spring suspension, which greatly enhanced mobility and reliability. In 1933, a torsion bar suspension system was developed which could have greatly improved tank mobility, but the lack of funds forced RIA to continue to rely upon volute bumper springs instead.[89]

By 1936, RIA was finally able to produce an upgraded version of the T1 light tank, with the first version standardized as the M2A2 light tank. The 9.5-ton M2A2 was equipped with twin machine-gun turrets, one mounting the .50-cal. (12.7mm) heavy machine-gun. In addition, the M2A2 was relatively fast and adequately protected (16mm of armour) for a tank of the mid-1930s. Recognizing that it finally had a decent light tank, serial production was begun and RIA was able to manufacture 311 tanks over the next three years. In response to lessons learned about armoured combat in the Spanish Civil War, the US Army Ordnance Department requested an upgraded version of the M2 tank in late 1938, armed with a 37mm gun and 24mm of armoured protection. For the first time since the end of the First World War, the US Army decided to issue contracts to a private firm, American Car & Foundry in Berwick, Pennsylvania, to manufacture 329 of the new M2A4 light tank. Production was just ready to begin in 1940, when the German invasion of France began.

Table 3: United States Tank Programmes, 1932–41

	M2A4 Light	M3 Light	M3 Grant/Lee	M4 Sherman
Requirement	December 1938	July 1940	July 1940	February 1941
Developer	Rock Island Arsenal			
1st prototype	May 1939	December 1940	April 1941	September 1941
Orders	1939: 329	N/A	1941: 3,000	1942: 5,400
Cost		$32,000	$55,000	$46,000
Production begins	May 1940	March 1941	April 1941	February 1942
Manufacturers	American Car & Foundry (ACF)	American Car & Foundry (ACF)	Detroit Tank Arsenal Baldwin Locomotive Works American Locomotive Company Pressed Steel Car Company Pullman Standard Manufacturing Co.	Lima Locomotive Works Pressed Steel Car Company Pacific Car and Foundry

One of the key figures who joined the RIA design team in the early 1930s was Joseph M. Colby, who was commissioned from West Point as a cavalry officer in 1929, then switched to Ordnance in 1931. Colby was an accomplished engineer who also earned a degree from the Massachusetts Institute of Technology (MIT) in 1935. He played an important role in developing many new features that would appear in the forthcoming generation of American tanks, including suspension systems, individual track blocks clad in rubber and with centre guides, as well as recoil systems for main guns. Colby was also one of several engineers at RIA who recognized the need for a high-torque diesel tank engine, but when the chief of Ordnance asked for $100,000 in 1939 to cover the design costs, he was rebuffed.[90] Consequently, much of the blame for deficiencies in the first generation of US tanks in the Second World War lies with the bean counters, not the engineers.

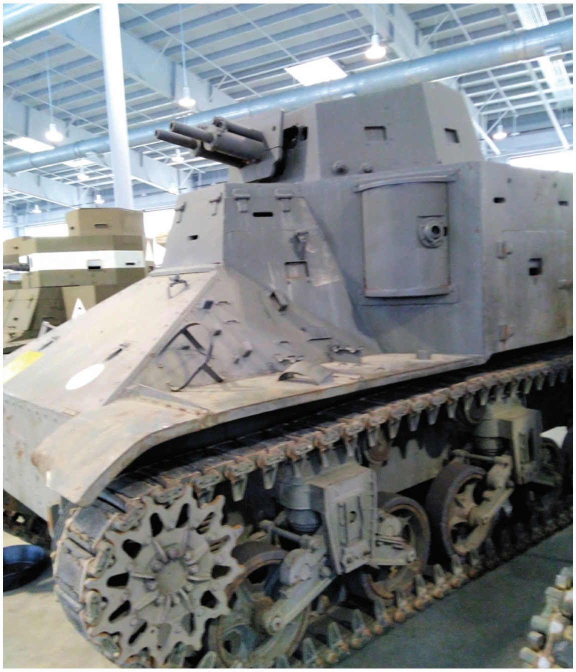
While the engineers at RIA laboured to manufacture better tanks, the infantry and cavalry branch diverged on how to organize and employ future armoured units. Doctrinally, the infantry branch view of tanks at Fort Benning (as espoused by the 1931 infantry field manual) remained stuck in the mindset of 1918, regarding tanks as possessing only one mission – to slowly advance in close support of infantry units.[91] The infantry branch controlled two armoured regiments (nominally, each with three battalions), plus seven separate tank companies which could be attached directly to infantry divisions. Infantry officers served in the tank units and developed the over-sized tables of organizations, which envisioned up to 300 tanks in a regiment. However, the tanks were obsolescent and scattered over multiple bases, which precluded large-scale training. The limited field training that did occur mostly focused on gunnery, rather than tactics. Nor had the infantry branch invested in radios for their tanks, which made controlling large formations problematic.

In contrast, the cavalry branch embraced mechanization and a more vibrant attitude toward armoured operations. Although there was resistance in the cavalry from officers who recognized that mechanization would lead to the abandonment of horses, there were enough visionaries to advance an evolutionary agenda. Forbidden by the 1920 National Defense Act to possess tanks, in November 1931 the 1st Cavalry Regiment (Mechanized) was formed and outfitted in Texas with available armoured cars and motor vehicles. The regiment was not able to relocate to Fort Knox until March 1933 and then was forced to devote many of its personnel and trucks to support President Roosevelt's Civilian Conservation Corps (CCC) programme.[92] The 7th Cavalry Brigade (Mechanized) was also established as a command headquarters, but initially had no other units assigned. It was an inauspicious start. Nevertheless, the cavalry branch began developing a unique doctrine for the mechanized cavalry. Unlike the infantry branch, the cavalry envisioned multiple missions for its armoured units, including reconnaissance, screening, guard and delay. Yet the cavalry also added in a close combat mindset, which emphasized fire and manoeuvre.

Instead of focusing on tanks – which it was not supposed to have – the mechanized cavalry emphasized the development of a whole new family of armoured scout cars. The 4x4 M1 scout car was the first of the series, with 76 purchased in 1934; improved M2 and M3 scout cars followed in 1935 and 1936. The 6.25-ton M3 scout car was armed with the new .50-cal. machine-gun, which gave it equivalent firepower to contemporary tankettes. However, the cavalry branch felt that wheeled armoured scout cars lacked all-terrain mobility and began investigating the integration of existing designs with the French Citroën-Kégresse halftrack technology. By 1938, the cavalry branch was testing a prototype halftracked armoured personnel carrier that would evolve into the M2 halftrack. In the meantime, the 7th Cavalry Brigade (Mechanized) finally had enough new equipment to add another mechanized cavalry regiment and a motorized artillery battalion. Small numbers of M1 combat cars (light tanks) were also added to the brigade. During field manoeuvres in the summer of 1936, the brigade also trained with an attached motorized infantry battalion, which encouraged the cavalry officers to push for permanent attachment of infantry, signals and engineer detachments. By the time that Chaffee took over command in 1937, the 7th Cavalry Brigade (Mechanized) was the only combined arms formation in the US Army. The brigade made a favourable impression at the First Army manoeuvres at Plattsburgh, New York in the summer of 1939.[93]

When war broke out in Europe in September 1939, the US Army had two armoured forces. The infantry branch had a provisional tank brigade with 280 modern M2-series light tanks armed with machine-guns, but none with cannon. Although the infantry branch had started a gun-armed medium tank programme (T5), the resulting M2/M2A1medium tank proved to be a conceptual disaster and was cancelled after a short production run. The cavalry branch had its one mechanized brigade, which was equipped with about 100 machine-gun armed M1/M1A1 combat cars. No single unifying doctrine existed for the two armoured forces. In contrast to France, Germany, the Soviet Union and even Britain, the US Army's mechanized force was small, inexperienced and ill-prepared even for large-scale training exercises. Everything changed in June 1940, when the leadership in the US Army were confronted with the indisputable fact that German armoured forces had played a critical role in defeating the French Army in just six weeks. The time for debate was over. On 30 June 1940, the National Munitions Program was approved, which called for purchasing 1,690 medium tanks in the next 18 months, along with 200 scout cars and 744 personel carriers.[94]

On 10 July 1940, the War Department established the Armored Force – which merged the infantry and cavalry mechanized units – and put Chaffee in charge of it. Five days later, the War Department authorized the creation of two armoured divisions: the 1st Armored Division would be based on the 7th Cavalry Brigade (Mechanized) at Fort Knox and the 2nd Armored Division would be based on the Provisional Tank Brigade at Fort Benning. Patton was brought back from the cavalry to command one of the tank



The 18-ton M2 medium tank was the most modern armoured fighting vehicle in the US Army at the start of the Second World War. This M2A1 variant is armed with dual 37mm guns. In August 1940, the US Army recognized that the M2 was obsolete and switched to the M3 medium tank, armed with a 75mm gun. (1LT Andrei Forczyk)

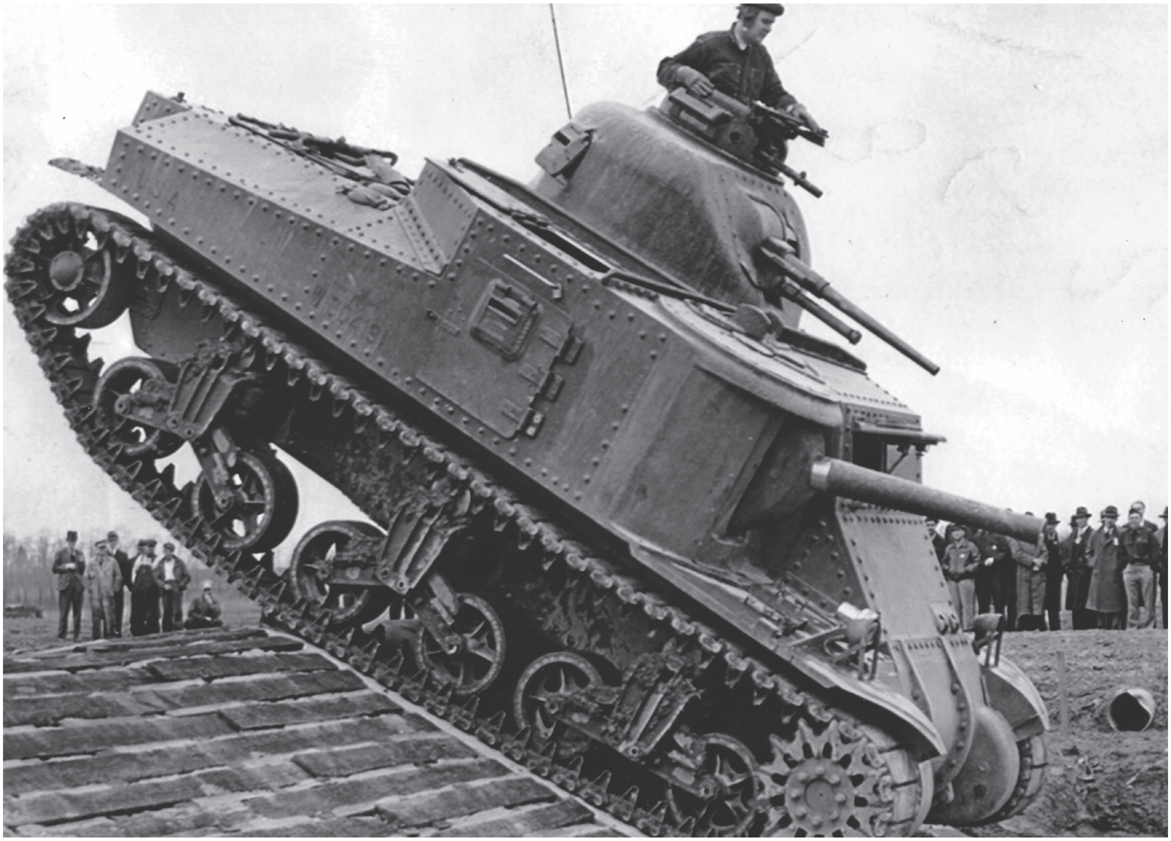
brigades in the nascent 2nd Armored Division.[95] Since the cavalry branch had the more mature, combined arms approach to mechanized warfare than the narrowly defined infantry branch approach, the cavalry was able to shape the doctrine for the new armoured divisions. Yet despite the emphasis on creating armoured divisions, the infantry branch succeeded in convincing the War Department to create a number of separate tank battalions which would be assigned to General Headquarters (GHQ) as corps-level assets, then attached to infantry divisions as needed; one separate tank battalion was formed in 1940, followed by 14 in 1941 and 13 more in 1942. As a result of this end-run by the infantry branch, a large portion of the US Army's armoured force would remain dispersed and under infantry control.

In terms of structure, the 15 November 1940 Table of Equipment and Organization (TO&E) for the new armoured divisions created very large, tank-heavy formations. The 1940 armoured division comprised nine tank battalions (three medium, six light), two mechanized infantry battalions, seven towed artillery batteries, one armored reconnaissance battalion, one engineer battalion and various support units. Each armoured division would be equipped with 432 tanks (161 M3 Grant and 271 M3 Stuarts) and 600 M2/M3 halftracks. The 1940 armoured division was designed around the cavalry-developed concepts of manoeuvre warfare, but the tank-infantry ratio of 9:2 battalions was extremely unbalanced and the armoured units were simply too large to effectively control. Organic fire support was also inadequate, depending on just 28 105mm howitzers.

The US War Department's budget increased by one-third in 1940 and the development of armoured fighting vehicles was suddenly untethered from the decade of previous fiscal austerity. However, Chaffee and other armour officers recognized that the new M2A4 light tank, just beginning to roll off assembly lines, was unsuited to meeting the kind of enemy that had just overrun France. Consequently, production of the M2A4 was limited to 325 tanks for training purposes, but Chaffee requested that RIA instead shift its priority to developing an improved light tank with better armoured protection; this would become the M3 and M3A1 light tanks. In August 1940, the War Department invested resources into the crash development of a new medium tank, armed with a 75mm gun. However, asking industry to leapfrog from building small numbers of machine-gun-armed tanks to building large numbers of gun-armed tanks in just one year proved too much, which led to an evolutionary approach. Joseph M. Colby, now a captain, was one of the primary designers of the medium tank. Earlier in the year, the French had provided RIA with the designs for their Char B1bis tank (in the hope that the Americans would manufacture copies for export to France), which influenced Colby's design. As a result, the 30-ton M3 medium tank that emerged from a frantic 60-day development period featured a 75mm gun mounted in a hull-mounted sponson and a 37mm gun in a small turret, similar to the French Char B1bis layout. The M3 also incorporated technology from existing programmes, such as the failed M2A1 medium tank, in order to build an interim tank as soon as possible. The M3 was an expedient design that was far from ideal, but it could be built quickly and in quantity. While accepting the necessity of building the M3 in order to provide the US Army with a medium tank as soon as possible, the long-term solution was the T6 programme, begun in February 1941. The T6 featured a turret-mounted 75mm gun and it would be standardized in 1942 as the M4/M4A1 medium tank. In addition, both the M2 and M3 halftracks were ready to begin production by October 1940 and they would be used to equip the new mechanized infantry regiments.

However, before the US Army could receive any of the new tanks, Winston Churchill set his sights on acquiring American-built tanks to supplement Britain's own troubled post-Dunkirk tank production programmes. The British Purchasing Commission (BPC) had been sent to the United States to purchase a wide variety of military hardware and Michael Dewar, a British industrialist, was assigned in July 1940 to negotiate a tank deal with the Americans. Dewar had previously worked at Vickers and had experience with tank production in the First World War. In addition, Dewar was joined by Brigadier Douglas Pratt, who had commanded the 1st Army Tank Brigade at Arras in May, and by L. E. Carr, an experienced tank engineer. Initially, Dewar hoped that the Americans would agree to manufacture British-designed tanks like the Cruiser Mk IVA or Matilda II in US plants, but the National Defense Advisory Commission quickly squashed that idea. Instead, the BPC would have to purchase American-designed tanks and pay in cash.[96]

Brigadier Pratt disliked the wooden mockups of the M3 medium tank he was shown at Aberdeen Proving Grounds. He regarded the tank as too tall, its suspension as suspect and its armour as too thin. Pratt suggested an increase of armour thickness to 50mm and a re-designed turret before he would recommend a major purchase by the BPC.[97] Nor was Pratt impressed with the M3 light tank, which, being armed only with a 37mm gun, seemed to offer no advantage over British cruiser tanks. Nevertheless, Churchill wanted American-built tanks for the British Army and Dewar was left with no real alternatives. Thus in October 1940, the BPC placed large orders for both the M3 light tank and M3 medium tank. Even some M2A4 tanks were ordered, for training purposes. As it turned out, the American factories slated to produce the new tanks were more notional than real and some plants were not only derelict, but lacked machinery. The BPC was induced to provide £3.8 million ($16.57 million) just to jump-start production, plus millions more for production contracts.[98]



The M3 medium tank prototype undergoing trials in March 1941. In a crash effort to provide a 75mm gun armed tank to the US Army as quickly as possible, the engineers at Rock Island Arsenal followed the example of the French Char B1 bis and mounted the main gun in the hull with a secondary 37mm gun in a small turret. Although only an interim design, over 6,000 M3 medium tanks were built in 18 months. (Author's Collection)

Given the level of British investment in the medium tank programme, the US Ordnance Department agreed to allow British designers to develop a new cast turret for the M3 medium tank, as well as other improvements.

Needless to say, the US Army was not happy to see many of its new tanks being sent overseas, rather than used to train and equip its own armoured units. By the spring of 1941, the two existing armoured divisions had sufficient M2A4 light tanks to conduct useful training and the first M3 light and M3 medium tanks were rolling off the assembly lines. However, experienced armoured leaders could not roll off assembly lines and finding capable officers to lead these new formations proved difficult. Major General Lesley J. McNair, appointed commander of the General Headquarters (GHQ) tasked with training all the newly created formations, tended to select officers for command who looked good on paper, but not necessarily in fact. McNair's selections were also influenced by General George C. Marshall, army chief of staff, who had a list of likely command cadre in his famous 'little black book'. McNair and Marshall also had a tendency to select officers who were known for polished staff work rather than command experience or technical expertise. Consequently, they picked Colonel Orlando Ward to be a brigade commander in the 1st Armored Division and Colonel Paul M. Robinett to command an armoured regiment in the same division. Neither Ward nor Robinett had any prior experience with tanks but both officers had worked on the staff directly under McNair and Marshall. Ultimately, Ward was relieved of command in Tunisia in April 1943 and Robinett's performance was controversial.

In order to test the newly formed units, Marshall and McNair organized a series of large-scale field exercises in late 1941. During the Louisiana Manoeuvres (15–28 September), the 1st and 2nd armoured divisions were grouped under the I Armored Corps. Chaffee had been in charge of the armoured corps, but he died of cancer in August 1941 and another cavalryman, Brigadier-General Charles L. Scott, replaced him. The Louisiana Manoeuvres went badly for the two armoured divisions due to a combination of inexperienced leaders, communications problems and faulty tactics. Like British armoured units in 1940–41, the American tankers tended to charge into a meeting engagement with no reconnaissance and limited support. Consequently, the anti-tank units were assessed to have destroyed over 300 tanks in two days. The Carolina Manoeuvres on 16–28 November did not go well for the armoured force either and the 1st Armoured Division was assessed to have been surrounded and destroyed. McNair believed that the exercises proved the superiority of towed anti-tank guns over tanks and, without waiting for any real analysis, recommended the formation of a new branch to consolidate anti-tank units. As a result of McNair's snap decision, the Tank Destroyer branch was established at Fort Hood, Texas in December 1941. While the formation of dedicated anti-tank units was a sound idea, the doctrine and weaponry of the Tank Destroyer branch proved problematic for the armoured forces when committed to battle in North Africa.

By the time of the German declaration of war in December 1941, three more armoured divisions had begun forming, giving the United States a total of five. Another more positive result of the Louisiana and Carolina manoeuvres was the creation of two brigade-size combat commands (A and B) in each armoured division; these headquarters could be assigned various assets depending upon the mission. The combat command was Chaffee's idea and was an important step toward enforcing a combined arms, mission-focused mindset into the US armoured divisions. In March 1942, the War Department also decided to substantially modify the armoured division TO&E by reducing the number of tank battalions in the division from 9 to 6, while increasing the number of mechanized infantry battalions from 2 to 3. The new 6:3 tank-infantry ratio represented a far more balanced formation. Artillery firepower was also doubled and put under a Divisional Artillery (Divarty) command, which could centrally direct fire support. The 1st and 2nd armoured divisions retained the larger organization when they deployed to North Africa in 1942, but the rest of the armoured force was trending toward fewer tanks and more support forces. Although the US Army had made little progress in tank design or doctrine during most of the inter-war period, the amount of progress made in 1939–41 was astounding. Indeed, the intensity of American industrial mobilization, which enabled the mass production of medium tanks, provided the US Army with a long-term advantage in armoured warfare.

ITALY'S MECHANIZED FAÇADE

'You can be sure that with these medium tanks we will do wonders.'

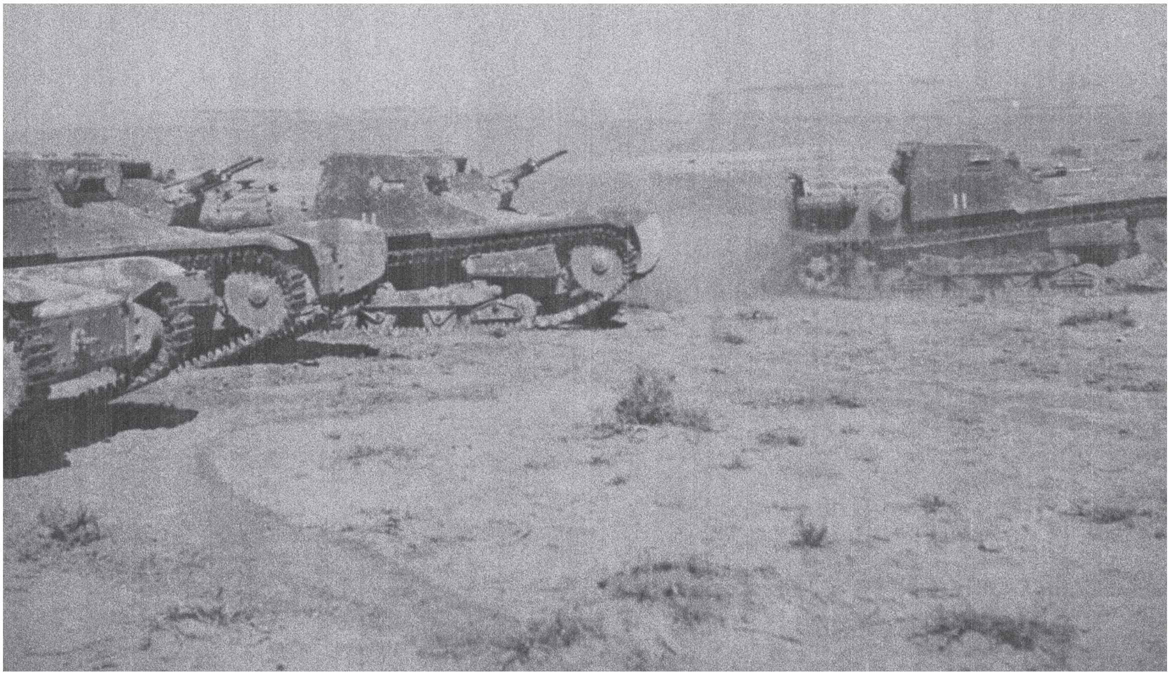
Maresciallo Italo Balbo, 23 June 1940

The Royal Italian Army (Regio Esercito) had no experience with armour in the First World War, but Fiat acquired a licence to build copies of the Renault FT light tank in late 1918. During 1921 to 1926 Fiat built 100 modified FT tanks, which were designated Fiat 3000 and used to equip two battalion-size tank groups.[99] The 5.5-ton Fiat 3000 Model 1921 was a two-man light tank equipped with two 6.5mm machine-guns. The only real improvement of the Fiat 3000 over the original Renault FT was a more powerful engine, which significantly increased speed and mobility. In 1928, Fiat began work on an improved Fiat 3000, equipped with a 37mm gun, which would enter service as the Model 1930. A tank training school was established at Forte di Pietralata outside Rome in 1924, operated by the infantry branch. Of the officers assigned to the school, 44 came from the infantry, 12 from artillery and just one from the cavalry. By 1927, the two Fiat 3000 battalions were expanded into a tank regiment (Reggimento Carri Armati) with five small battalions. However, each battalion was only authorized 20 tanks and 100 personnel and the units were dispersed across Italy, which discouraged large-scale training.[100] Indeed, the tank regiment was an administrative entity, never intended for use as a large combat unit. In 1931, the tank training school shifted from Rome to Bologna. In addition, a group of four squadrons of armoured cars under Tenente Colonnello Valentino Babini were attached to the tank regiment for training.

Military doctrine in Italy was promulgated by the Ministero della Guerra (Ministry of War) and the Stato Maggiore (General Staff). Existing doctrine in the early 1920s was fixated on Italian military experience in the First World War, which thought only in terms of positional warfare. Tanks had very little place in existing doctrine, aside from being just another infantry support asset. The Regio Esercito had no Fuller, Guderian or Chafee to advocate for tanks and there was very limited organizational interest in mechanized warfare. The handful of Italian military officers who wrote about tanks and mechanization in the 1920s were easy to ignore. The Stato Maggiore expected any future conflicts to occur on

Italy's northern borders or in the Balkans, which were regarded as too mountainous for tanks. Consequently, the Italian General Staff emphasized developing forces that were best suited for mountain warfare, like elite Alpini or Bersaglieri regiments.

Yet once Benito Mussolini came to power – and added Minister of War to his portfolio – the Regio Esercito was forced to rethink its operational requirements. Mussolini had a thirst for acquiring new territory through colonial warfare, particularly in Africa. A company-size group of Fiat 3000 light tanks was sent to Libya to participate in counter-insurgency operations against the Senusi rebels, for which they were clearly ill-suited since slow-moving tanks with short range could hardly catch a fleeting enemy. Instead, the Regio Esercito relied upon Lancia 1ZM armoured cars and airpower to run the rebel groups to ground. Two battalions of Fiat 3000s were also used in the annual summer manoeuvres in 1929, but infantry officers were unimpressed with their limited mobility over rough terrain. Something new was needed. Given the limited experience of Fiat-Ansaldo in designing armoured fighting vehicles from scratch, the Regio Esercito decided to examine foreign designs. Italian military observers were interested in the Carden-Loyd Mark VI tankette and four were purchased from Vickers in 1929. The General Staff's Ispettorato Tecnico Automobilistico (Automotive Technical Inspectorate) tested the Carden-Loyd tankettes and found them sufficiently useful to order 25 kits, which could be assembled in Italy by Fiat-Ansaldo. Once completed, the tankettes were designated as the Carro Veloce 29 (fast tank) or CV-29 and assigned to a special unit for testing and experimentation.[101]



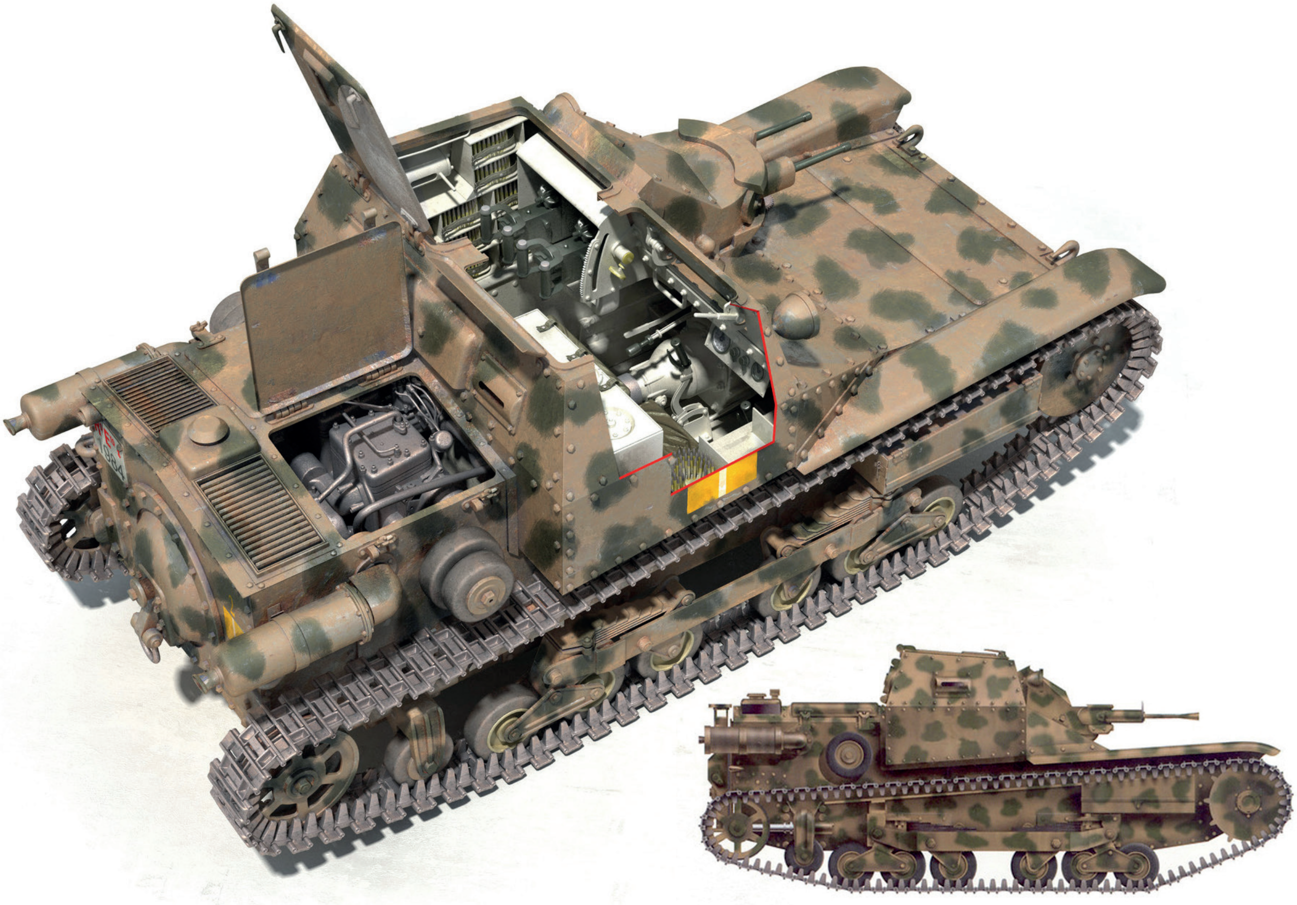
The Italian Regio Esercito developed its own tankettes from the original Carden-Loyd design. The L3/35 or CV-33 entered service in 1933 and over 2,000 of these tankettes were built prior to the Second World War. Although effective in colonial conflicts, the CV-33 was completely outclassed by all British tanks. (Author's Collection)

The Regio Esercito studied the CV-29 closely but recognized that it was only an interim design. However, the army leadership did not know what kind of AFVs they wanted because they had no doctrine for mechanized warfare and instead let subjective factors shape their weapons development programmes. The requirement that was handed to the Ansaldo design team in June 1930 specified a 1.7-ton vehicle, with a two-man crew protected by light armour, and a maximum height of just 1 metre. Essentially, the army quartermasters wanted a tankette that was easily transportable on heavy trucks, while the War Ministry wanted a vehicle that was inexpensive and simple for Fiat-Ansaldo to manufacture. The only real tactical requirement from the infantry branch was the need for a tankette that was fast and manoeuvrable, particularly in rough terrain. The new tankette entered service in 1933 as the L3/35 or CV-33. Despite very tight budgets due to the Global Depression, the low cost of the new CV-33 enabled the Regio Esercito to purchase it in bulk, with over 600 built between 1933 and 1935. A slightly improved version known as the CV-35 entered service in 1935. Ironically, instead of providing the new tankettes to the infantry's armoured regiment, most were turned over to the cavalry branch, which used Colonnello Gervasio Bitossi's 19th Cavalry Regiment 'Cavalleggeri Guide' as a school unit to train and form five fast tank groups, each with about 60 CV-33/35s. The army's armoured regiment, mostly still equipped with Fiat 3000 tanks, was re-branded as *carri d'assalto* (assault tanks).

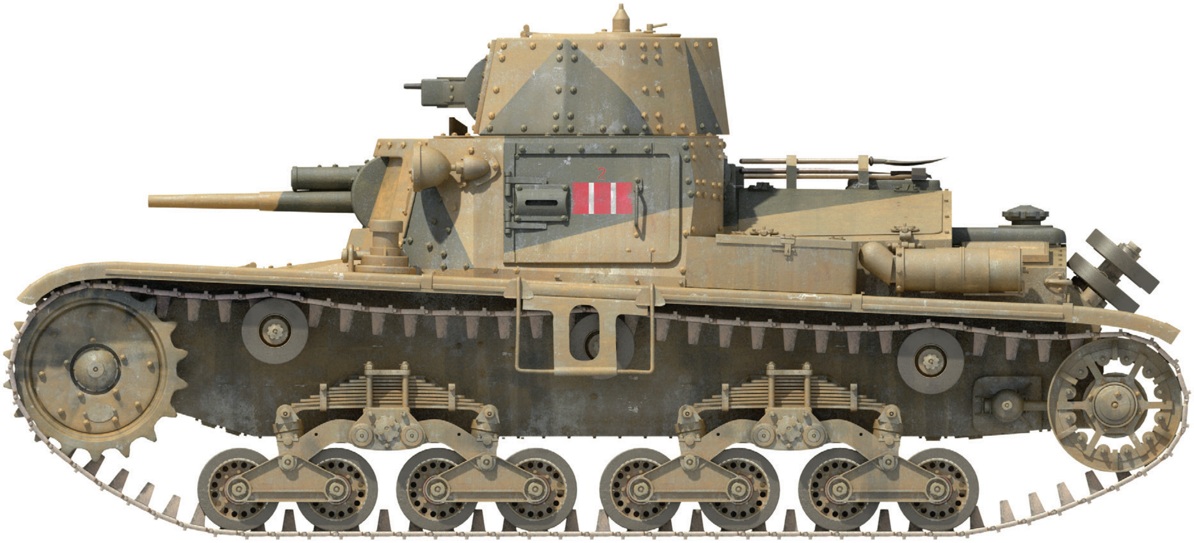
By 1935, Mussolini had set his sights on colonial acquisitions in East Africa and he directed the army chief of staff, Generale Federico Baistrocchi, to prepare the army for mobile warfare. In order to move the Regio Esercito away from the trench warfare mindset of 1918, a new field manual was published and Baistrocchi began talking about *guerra lampo* (fast war) and the need for mechanization.[102] However, issuing Fascist slogans was not the same as creating effective doctrine. Baistrocchi created three *divisioni celeri* (fast divisions), which combined two mounted cavalry regiments with a regiment of bicycle-mounted *bersaglieri*, one battalion of CV-33 tankettes and a group of partially motorized artillery. The *divisioni celeri* were hybrid units, with a weird mix of tankettes, trucks, bicycles and motorcycles that were ill-suited to work together on a battlefield, and they were not based upon any doctrinal concepts that had been worked out in advance. The real problem was that Italy was a poor nation, both in terms of financial resources and raw materials, which made it extremely difficult to develop new equipment and manufacture it in quantity. During most of the inter-war period, Italy only spent 60 per cent as much as Britain on defence and the Regio Esercito was last in priority for defence spending.

Nevertheless, Mussolini wanted to use his new tankettes in the invasion of Ethiopia and several of the new tank groups, with a total of about 175 CV-33s, were sent to Eritrea. Essentially, a battalion-size group of tankettes was attached to each of the infantry corps and they were used to spearhead mobile columns.[103] After an embarrassing tactical defeat at Demberguina Pass on 14

December 1935, in which Ethiopian infantry destroyed an isolated detachment of six CV-35s, the Italian tankettes performed fairly well in the Ethiopian campaign of 1935–36. The fact that a CV-35 could be transported in the back of a Fiat SPA 38R 2.5-ton truck gave the tankettes much greater operational range than they normally possessed and greatly reduced wear and tear on their tracks. In large part, Italian tankers (*carristi*) were emboldened by the fact that the Ethiopian armies had virtually no anti-tank guns or artillery, which enabled tankettes equipped with machine-guns and flamethrowers to rip through lightly armed infantry formations. Complete air superiority and the liberal use of chemical weapons also facilitated the defeat of Ethiopia's large but poorly equipped infantry armies. Although the Italian advance was slowed by rough terrain and logistic factors, the ability of tankettes and motorized infantry to advance 700 kilometres to reach Addis Ababa by 5 May 1936 demonstrated that the Regio Esercito was capable of successfully conducting operational-level mobile warfare. Indeed, this was an achievement that Hitler's new Panzer divisions, equipped solely with the Pz I tankette, were incapable of replicating at the time.



The CV35 tankette was a slightly improved model introduced in 1935, equipped with twin 8-mm machine-guns. Although the Italian Army experimented with installing different armaments, such as flamethrowers and 20-mm anti-tank rifles, the vehicle was simply too small and under-powered to accommodate significant upgrades. (© Osprey Publishing Ltd, by Richard Chasemore. From NVG 191 *Italian Light Tanks: 1919–45*)



The Italian M11/39 medium tank, September 1940. (© Osprey Publishing Ltd, by Richard Chasemore. From NVG 195 *Italian Medium Tanks: 1939–45*)

Hardly had the Ethiopian campaign ended when the Regio Esercito was tasked to provide troops and equipment to intervene in the Spanish Civil War on the side of the Nationalist forces. In August 1936, a platoon of CV-35 tankettes was sent to Spain, followed by more the next month. However, unlike Ethiopia, the adversary possessed anti-tank guns and better tanks. The Soviet Union sent T-26 light tanks (based on the Vickers 6-ton tank) to aid the Spanish Republicans and these AFVs, armed with a 45mm gun, completely out-classed the Italian CV-35s. Germany also sent tanks to Spain to support the Nationalists; Oberstleutnant Wilhem Ritter von Thoma commanded a Panzer detachment equipped with 41 Pz I light tanks, which were also out-classed by the T-26 tanks.[104] Nevertheless, Mussolini ordered more forces sent to Spain, which were organized into the Corpo Truppe Voluntarie (CTV). During the winter of 1936/37, an Italian tank battalion was formed in Spain and grouped with some armoured cars, machine-gun troops and light artillery into the Raggruppamento Carristi (Tank Corps Group). In March 1937, the CTV tried to use its mechanized forces in the Battle of Guadalajara, but Republican T-26 tanks mauled one company of CV-35s and the Italian offensive turned into a disaster. It should also be noted that the Italian CTV generally split its tanks up into small groups in the infantry support role. As a result of the tank versus tank combat in Spain and the lethality of modern anti-tank guns, the Stato Maggiore realized that tankettes were no longer survivable on the battlefield.[105]

After examining captured T-26 tanks in Spain, the Stato Maggiore established a requirement to acquire a larger, gun-armed tank, in order to compete with foreign tanks. Prior to the Spanish intervention, Italian officers had not seen any need for medium tanks, but the shocking vulnerability of the CV-35 to modern weapons prompted a crash programme. The War Ministry had already tasked the Ansaldo design team to begin developing a new tank in 1935, but the project was low priority until the

T-26 appeared. Now under time pressure, the Ansaldo engineers opted for the expedient approach of melding features of the Vickers 6-ton tank (one had been purchased for evaluation) with some existing technology from the CV-35 tankettes. Since the Fabbrica d'Armi Terni already had a licence from Vickers to manufacture the low-velocity 37mm/L40 gun for the Fiat 3000 Model 1930, it was decided to use this weapon on the new tank. Fiat-Ansaldo built two prototypes in 1936–37, which were not entirely satisfactory; the army wanted the main gun mounted in a fully rotating turret but Ansaldo was unable to mount the 37mm gun in the small turret, so instead mounted it in the hull. It was not until mid-1938 that the Regio Esercito was willing to order 100 of the new tanks, which were designated as the M11/39 medium tank. Equipped with the Ansaldo 8-cylinder model 8T diesel engine (105 horsepower), the 11-ton M11/39 was rather under-powered compared to most comparable foreign tanks. Although the M11/39 was slightly superior to the awkward British A-9 tank in terms of armoured protection, it was otherwise out-classed by the improved British cruiser tanks in development. The M11/39 also lacked a radio, which put it at a major tactical disadvantage. Furthermore, it took Fiat-Ansaldo nearly 18 months to begin production of the new tank and was only able to manufacture about nine tanks per month beginning in August 1939.

Table 4: Italian Tank Programmes, 1930–41

	CV-33 and L3/35	M11/39	M13/40	L6/40
Requirement	June 1930	1937	December 1937	December 1938
Developer	Fiat-Ansaldo			
1st prototype	1931	May 1938	October 1939	October 1939
Orders	1933: 240 1935: 500 1936: 500	1938: 100	1939: 400	1940: 583
Cost	93,720 lire (£1,040)	520,000 lire (£5,700)[106]	650,000 lire (£7,200)	340,000 lire (£3,770)
Production begins	1934	July 1939	July 1940	March 1942
Manufacturer	Fiat-Ansaldo			

Recognizing that the M11/39 was simply an interim solution to provide the Regio Esercito with some kind of medium tank, the Stato Maggiore also issued Fiat-Ansaldo with the requirement to develop a more modern design. Specifically, the army wanted the new high-velocity Breda 47/32 M35 cannon mounted in a fully rotating turret, which would provide firepower equivalent to the Soviet T-26 tanks. Rather than starting from scratch, Ansaldo used the same chassis as the M11/39 and focused on building a larger two-man turret. The first prototypes were not ready until after the outbreak of the Second World War in Europe, but the Regio Esercito readily accepted the vehicle as the M13/40 medium tank and placed an order for 400 before the end of 1939. While Fiat-Ansaldo was labouring to bring the M11/39 and M13/40 medium tanks to fruition, the Stato Maggiore decided to add on a nonsensical requirement for a new light tank, to be equipped with a Breda 20mm autocannon. By this point, the Stato Maggiore already knew that gun-armed tanks were critical to building a modern armoured force, but hoped that Fiat-Ansaldo could manufacture a new light tank in quantity. However, the resultant L6/40 light tank project proved to be a complete failure, which by the time the first production models reached North Africa in early 1942 was already obsolete.

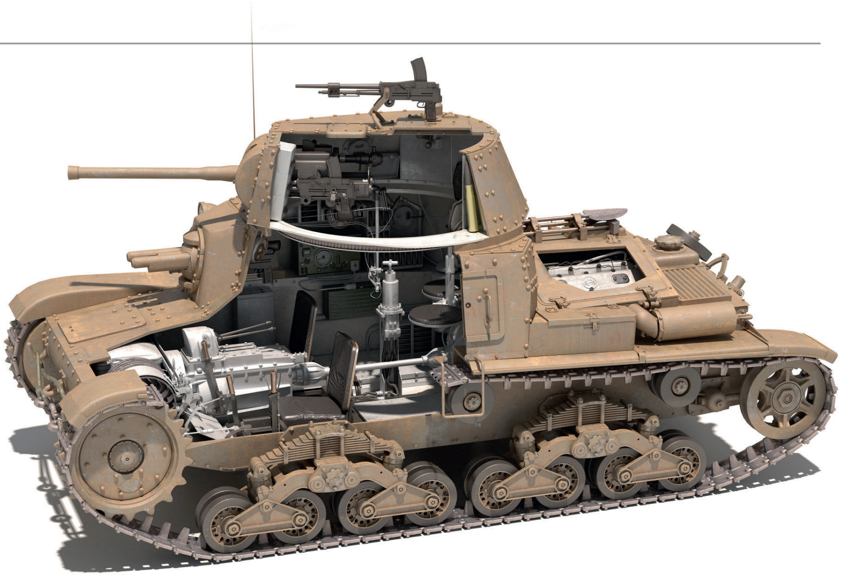
After the Ethiopian campaign ended, the Regio Esercito moved to create new mechanized formations and doctrine, although in a haphazard manner. In May 1936, the War Ministry created 24 armoured battalions (five with the Fiat 3000 and 19 with the CV-35): 16 battalions were assigned to four new armoured regiments (which would dole out battalions to support infantry corps in wartime), but three battalions went to the *divisioni celeri,* several to other cavalry regiments and some as independent units. However, this dispersion of existing armour assets to units that had a wide variety of missions and responsibilities made it difficult to create a coherent form of mechanized warfare. Indeed, some battalions were focused on infantry support, some on cavalry missions such as reconnaissance and others on overseas counter-insurgency missions in occupied Ethiopia. While Fiat-Ansaldo was able to manufacture enough CV-35 tankettes to outfit these new battalions, the supply of trained tankers (*carristi*) was more constrained. The Regio Esercito depended on short-term conscripts, few of whom had previous civilian experience with driving or vehicle maintenance. The number of officers who possessed experience with armoured fighting vehicles was even more constrained – fewer than 200 – but over 600 were needed for the new battalions, which seriously undermined the ability to shape recruits into competent tank crews.

The Regio Esercito was also constrained in purchasing modern equipment to build a proper combined arms team, due to the huge expenditure of resources on the Ethiopian and Spanish campaigns. Over 18 billion lire had been spent on the two campaigns, which added up to more than one-third of Italian defence spending in 1935–38. Italian field artillery pieces were obsolescent and not suited for the tempo of mobile warfare; only 20 per cent were capable of being towed by vehicles. Italian doctrine specified that the field artillery would deal with enemy tanks, but the standard Cannone da 75/27 Model 1906 could not accurately hit tanks beyond 400 metres and it could not defeat the Matilda II's thick frontal armour. Indeed, none of the extant Italian field artillery had telescopic sights or the ability to pivot rapidly to engage moving targets. Amazingly, the Regio Esercito had invested no effort in developing anti-tank guns or medium-calibre weapons for new tank designs. Instead, Fiat purchased a licence to manufacture the Austrian-designed Böhler 47mm cannon (which was designated as the Cannone da 47/32) to fit both roles. Nor did Italy invest in developing armoured tracked vehicles for their infantry, like the Anglo-Americans and the Germans. However, Italian industry did produce several trucks that were well-suited for mobile operations in North Africa. In particular, the Breda SPA 35 Dovunque ('Anywhere') 2.5-ton truck could carry 25 troops or a 20mm anti-aircraft gun or tow light artillery pieces; the Dovunque was extensively tested in Libya and enjoyed excellent off-road mobility. Likewise, the Lancia 3RO heavy truck also performed well in multiple roles in North Africa and could even transport medium tanks on a special cargo trailer. Fiat was also developing a new series of armoured cars, although these would not be ready before 1940.

One area where the Italian armoured units had a potential edge over their British opponents was in terms of close air support. The Regia Aeronautica (Royal Air Force) had put some effort into developing ground attack aircraft, which had been used extensively in both Ethiopia and Spain. The Breda Ba.65 fighter-bomber, armed with two 12.7mm heavy machine-guns, two 7.7mm machine-guns and a pair of 250kg bombs, was capable of conducting strafing and dive-bombing attacks. The newer Breda Ba.88 was also available, although it proved a serious disappointment in combat. While pre-war air-ground training was uncommon, the Regia Aeronautica was willing to provide close air support to the army when requested.

Despite the lack of proper equipment and adequate numbers of trained personnel, the War Ministry pressed ahead with forcing mechanization upon the Regio Esercito. As an interim step, a motor-mechanized brigade (1ª Brigata Motomeccanizzata) was formed in Siena in June 1936, with two battalions of motorized *bersaglieri*, one battalion of CV-35 tankettes and a light artillery group (with 12 obsolete 75mm field guns). An engineer officer, Brigadier Carlo Favagrossa, was put in charge of the brigade, but little training was conducted. A year later, in July 1937, this experimental unit was expanded into an armoured brigade (1ª Brigata Corazzata) with two more tank battalions and it participated in the 1937 summer manoeuvres, but it was not assigned an independent role.[107] Soon thereafter, a second armoured brigade was formed. Mussolini wanted a modern army, but quantity and appearance mattered more to him than quality and capability. He also preferred to place men in command slots based on political loyalty, rather than demonstrated competence. Consequently, in November 1938, the War Ministry stood up an armoured corps headquarters (Corpo d'Armata Corazzato) in Mantua, led by Generale Fidenzio Dall'Ora; this infantry officer had distinguished himself in the Ethiopian campaign in a logistic role, but had no previous experience with tanks. The corps was formed to command the two armoured brigades and two new motorized infantry divisions, but it was more of an administrative entity.

Once a general European war appeared imminent, the Italian War Ministry decided to upgrade both existing armoured brigades into divisions; the 131ª Divisione Corazzata 'Centauro' in Siena and the 132ª Divisione Corazzata



The M14/41 was a slightly improved Italian medium tank, of which 752 were built in 1941–42. The lack of an internal turret basket was a serious hindrance to the operational efficiency of the crew. On the positive side, the diesel-powered engine offered better fuel efficiency than German tanks and the relative homogeneity of the Italian armoured force simplified logistic requirements, compared to the British 8th Army, which was operating up to 5–6 different types of tanks in 1941–42. (© Osprey Publishing Ltd, by Richard Chasemore. From NVG 195 *Italian Medium Tanks: 1939–45*)

'Ariete' in Milan. On paper, each armoured division was authorized an armoured regiment with three battalions (total of 184 CV-35), a *bersaglieri* regiment (two battalions of motorized infantry, one battalion of motorcycle machine-gun troops) and two artillery battalions with a total of only 24 75mm/27 M1906. The division had no reconnaissance unit, only a single anti-tank company with eight 47mm guns and one engineer company. Overall, the Italian 1939 armoured division was little more than a brigade of tankettes, with modest infantry and artillery support. The formation lacked the radios, the support units or appropriate combined arms doctrine to actually conduct mechanized warfare against an enemy equipped with modern weapons. Although the Italian armoured divisions were nominally intended for independent mobile operations, their lack of artillery and supporting arms left them dependent upon neighbouring infantry corps. The officers assigned to command the 'Centauro' and 'Ariete' divisions were infantrymen with little or no prior experience with armour and they did not remain long enough to lead their divisions into combat in North Africa. Indeed, the Regio Esercito had a penchant for frequently rotating officers through command slots in order to placate ticket-punching regular officers.

Most training for Italian tank officers and enlisted crews (*carrista*) was conducted at either the infantry-run school at the Mazzoni barracks in Bologna or one of the cavalry-run schools. Officer training typically lasted about five months. Junior officers, such as Sottotenente Fulvio Jero, sent off to join the XXI Battaglione Carri Leggeri (XXI Btgl. Carri L.: Light Tank Battalion) in Libya in 1939, were reservists. In Jero's case, he had just completed law school and was looking forward to some overseas service. Given the almost exclusive training focus on CV-33/35 tankettes until 1940, Italian pre-war armour officers had virtually no training on long-range gunnery or using radios to control tank formations, which put them at a disadvantage against British armour officers. Another big training problem for the Italian armour branch was the paucity of enlisted personnel with prior driving experience, which meant that a large part of training focused on basic driver skills. Less time was devoted to tactical manoeuvring or skills such as learning how to occupy hull-down positions.

In April 1939, staff talks between the Stato Maggiore and the Oberkommando der Wehrmacht (OKW) began, and the Italians were quick to inform their would-be allies that Italy's armed forces would not be ready for war for another two or three years.[108] Given the limited manufacturing capability of Italy's armaments industry, even this estimate was likely too optimistic. When Germany invaded Poland in September 1939, the bulk of Italy's mechanized forces were massed with the 6th Army at Verona, which was dubbed the Armata 'Po' (Army of the Po) in northern Italy, since Mussolini was contemplating operations against Greece or Yugoslavia. The 6th Army had the 'Ariete' armoured division, the two motorized infantry divisions ('Trento' and 'Trieste') and the three *divisioni celeri*. The 'Ariete' division began to receive its first M11/39 medium tanks just before the start of the war but was not able to equip its two medium tank battalions (*battaglioni carri medi*) until spring 1940. The two motorized infantry divisions were rather small, with just seven infantry battalions and limited firepower. Altogether, the 6th Army had two medium and ten light tank battalions. Six other light tank battalions were stationed in Italy as army-level assets and the Divisione orazzata 'Centauro' had deployed to Albania.

Despite the shortage of medium tanks, the War Ministry made the foolish decision to send two tank companies (24 M11/39 tanks) to East Africa, where they would surely be isolated in event of war with Britain. The ministry also authorized the creation of a third armoured division – the 133ª Divisione Corazzata 'Littorio' – in November 1939, although this was merely a reshuffling of existing assets. By June 1940, the Regio Esercito had a total of 100 M11/39 medium tanks and 1,320 CV-33/35 tankettes. Thus, Mussolini possessed the appearance of a large mechanized army when in fact his mobile forces had been cobbled together with obsolete equipment and vague ideas about how to use them on the battlefield.

DOCTRINAL SUMMARY AND COMPARISON

'It is pardonable to be defeated, but never to be surprised.'

Frederick the Great

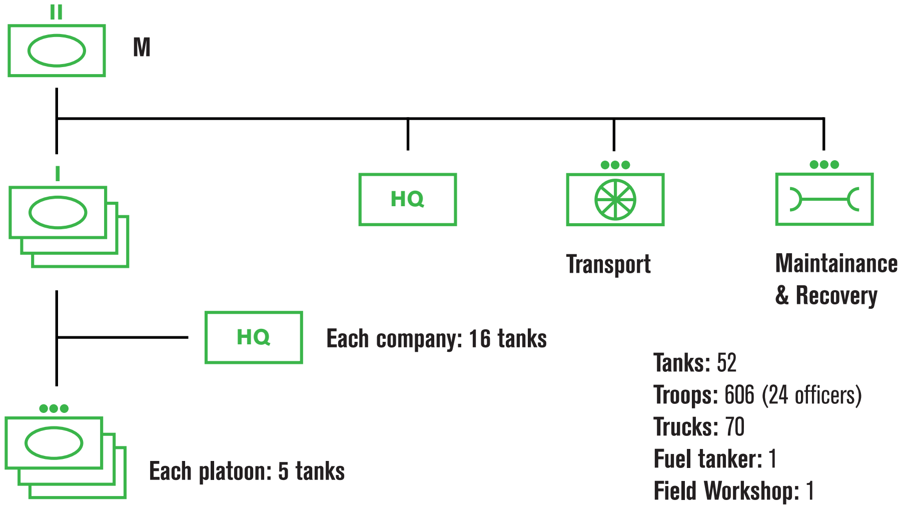
Germany's Panzerwaffe had the best validated doctrine for armoured warfare by the conclusion of the French campaign in June 1940. Although the Wehrmacht would continue to refine its doctrine during the North African, Balkan and Russian campaigns of 1941–42, the basic formula was well established and understood by most commanders at the tactical and operational levels. In particular, the use of fully integrated combined arms *Kampfgruppen*, based on sub-units that habitually operated together, was outstanding. German armoured doctrine proved well-suited to the open spaces of North Africa and Russia, where Panzer divisions could come into their own. The only real weakness in German manoeuvre warfare doctrine relates to combat sustainability – the Wehrmacht was simply not provided with sufficient materiel and logistic resources to conduct protracted, long-distance manoeuvre operations without wearing its forces out. Lack of spare parts, rubber tires, fuel and ammunition often acted as more of a brake on German armoured operations in 1941–42 than enemy resistance. German commanders tended to assume that providing the logistic support for mechanized operations was somebody else's problem, leaving them free to simply focus on combat operations – this was a blind spot in training that would haunt the Panzerwaffe throughout much of the Second World War.

Table 5: Comparison of armour doctrines, 1940–41

Nation	Operational-level doctrine	Tactical-level doctrine
Britain	Independent armour missions Use armour to outflank enemy and sever their LOCs Use of armour in pursuit operations	Reliance on tanks to achieve decisive results Ad hoc combined arms formations Infantry support missions C2 by radio Tank vs. tank combat Aggressive use of manoeuvre
Germany	Independent armour missions Use of *Schwerpunkt* to mass combat power at key point on battlefield Close air-ground cooperation Use of rapid envelopment to encircle enemy	Integrated combined arms tactics by default C2 by radio Tank vs tank combat Use of heavy Flak in anti-tank role
Italy	Use of armour as a corps-level asset Armour spearheads motorized operations Armour employed as mobile reserve Air-ground cooperation	Ad hoc combined arms formations C2 by flags/hand signals Reliance on AT/artillery to defeat enemy tanks Emphasis on infantry support role Screening, reconnaissance missions
United States	Independent armour missions Use of separate armoured units as corps-level assets	Modular approach to combined arms formations C2 by radio Reliance on tank destroyers to defeat enemy tanks

In contrast, British armoured doctrine was in a muddle after the disastrous French campaign, but there was little time to effect change. The RAC was pulled in two divergent directions – forming armoured divisions for independent operations while also forming tank brigades to support the infantry. Both types of formations were dangerously tank-heavy, with little regard for combined arms tactics. British operational-level commanders had very limited grasp of how to use their armour and tended to default to

ITALIAN MEDIUM TANK BATTALION ORGANIZATION, EARLY 1941



text-book methods taught at Camberley Staff College (Nigel W. Duncan, who attended Camberley in 1935–36, noted that armoured tactics and operations were virtually ignored in the curriculum), rather than try the innovative trial-and-error methods used by German commanders.[109] At the tactical level, British commanders regarded adding a few small infantry and artillery detachments to a tank-heavy force as an adequate nod to combined arms, which proved totally inadequate on the battlefield. Indeed, the British approach to forming temporary combined arms formations can be traced back to the mechanized experiments at Tidworth, which minimized the contributions of other combat arms. At both the operational and tactical levels, British commanders wanted to use armour aggressively – probably too aggressively – because the tank zealots regarded armour as the *ne plus ultra* of modern warfare. However, British armoured doctrine in 1940 and 1941 was still trying to figure out how to convert pre-war theory into wartime reality, which would prove to be a painful journey.

Due to the Regio Esercito's late start toward developing medium tanks, Italian armoured doctrine in 1940 was the least developed of all the armies that would fight in North Africa. Although striving to develop armoured divisions that would be capable of conducting independent operations, Italian armoured units in the first six months of the war were forced to operate as dispersed corps-level assets, which deprived them of mass. Furthermore, the lack of vehicle-mounted radios meant that Italian tactical-level commanders could not command and direct more than company-size units, which further limited the ability to mass combat power. Lacking the firepower or armoured protection to go toe-to-toe with enemy tanks or to achieve numerical superiority, Italian

Italian *carristi* tankers on a CV-33. Italian pre-war mechanized doctrine was rigidly locked into an infantry support mindset. Enemy tanks were to be defeated by the artillery in Italian infantry units, not by friendly tanks. (Author's Collection)

armoured units in North Africa in 1940 ended up being tied to their infantry units. Yet when pressed, Italian tankers (*carristi*) were far from timid and often aggressively charged the enemy. In theory, the Italian approach to combined arms was sound, particularly in long-term associations between armoured regiments and *bersaglieri* motorized infantry units, but materiel deficiencies prevented successful demonstrations on the battlefield until late 1941.

Like the British, the US Army armoured doctrine was in a muddle after the 1940 French campaign, which led to the creation of the separate Tank Destroyer branch. However unlike the British, the US Army would have two more years to rectify their doctrinal issues before meeting enemy armoured units on the battlefield. The American approach to forming modular armour units as building blocks (e.g. tank battalions were equipped with the same types of tanks, regardless of whether they were part of an armoured division or used as separate infantry support battalions) also proved less disruptive than the British approach, which used different tank types and methods between its armoured regiments assigned to armoured divisions and those assigned to infantry support brigades. Likewise, the American approach to forming combat commands/task forces was closer to the German *Kampfgruppen* approach than the British ad hoc methods. The US Army's armoured doctrine also greatly benefited from the additional time granted to field armoured personnel carriers and self-propelled artillery, which made for more robust combined arms teams when finally committed to action in North Africa. An additional advantage was that all three American tanks – the M3 (Stuart/ Honey) light tank, M3 (Grant) medium tank and M4 (Sherman) medium tank – would be battle-tested against the Deutsche Afrika Korps prior to the US Army using them in combat for themselves, so their comparative advantages and disadvantages were already known.

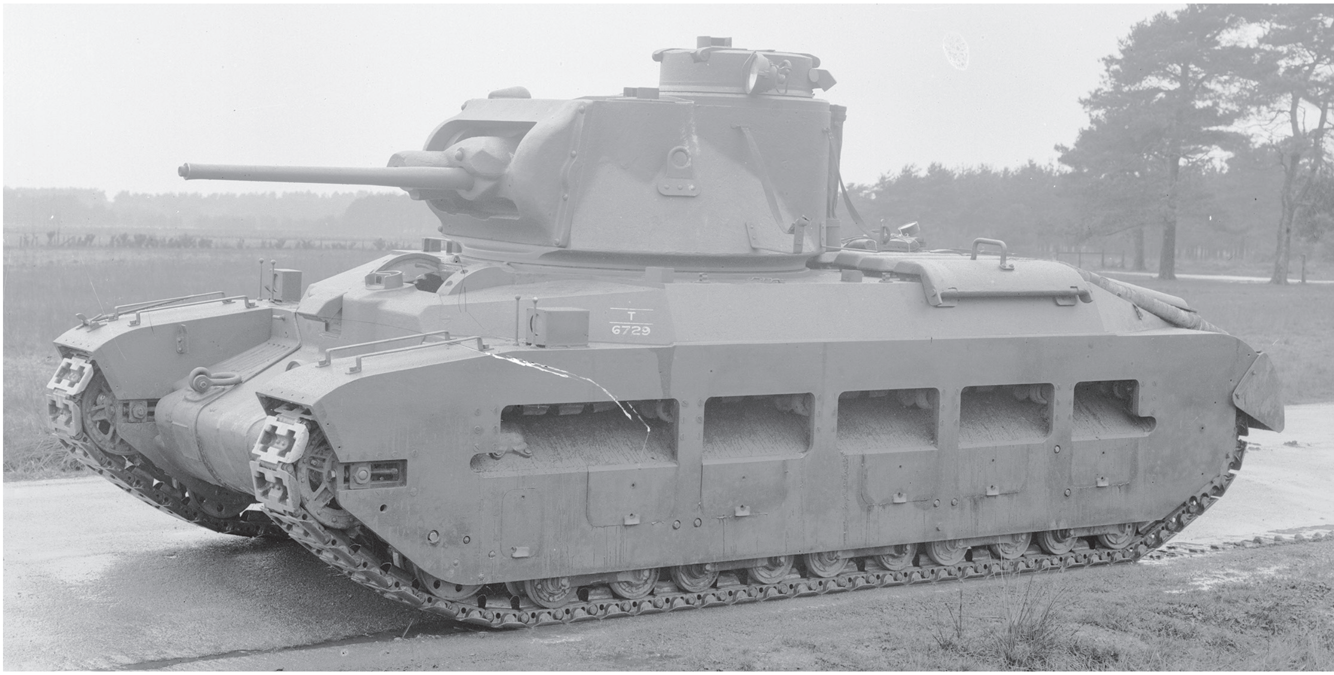
CHAPTER 2

THE OPPOSING ARMOURED FORCES IN 1940–41

ITALIAN ARMOURED FORCES IN LIBYA

> *'The olive branch of peace springs from a forest of eight million bayonets.'*
>
> *Mussolini*

On 10 June 1940, Italy declared war on Britain and France. Although the newly formed Comando Supremo (Supreme Command) was nervous that France might launch an attack upon Libya from Tunisia, the French armistice with Germany on 22 June quickly ended any threat from that quarter. Consequently, the only active front that the Regio Esercito had to worry about was North Africa and Britain's small army in Egypt. At the outset of the war, Italy had 225,000 troops in Libya, with two field armies and various garrisons: the 5ª Armata faced west against the French and the 10ª Armata faced east against the British. Altogether, these two armies comprised a total of 14 infantry divisions (nine auto-transportable, three CCNN 'Blackshirt' and two Libyan). The bulk of the combat power resided in the auto-transportable infantry divisions (*divisione motorizzata tipo A.S*), which only possessed one-third of the motor transport in a true motorized infantry division. Indeed, Italian forces in North Africa were configured more for defensive roles and lacked the organic mobility to manoeuvre with more than a fraction of their strength. Once the French threat evaporated, the 5ª Armata began



One of the original Matilda II (A-12) production models in late 1939. The Matilda II provided the Royal Armoured Corps with a significant if temporary battlefield advantage in 1940. (IWM, KID 586)

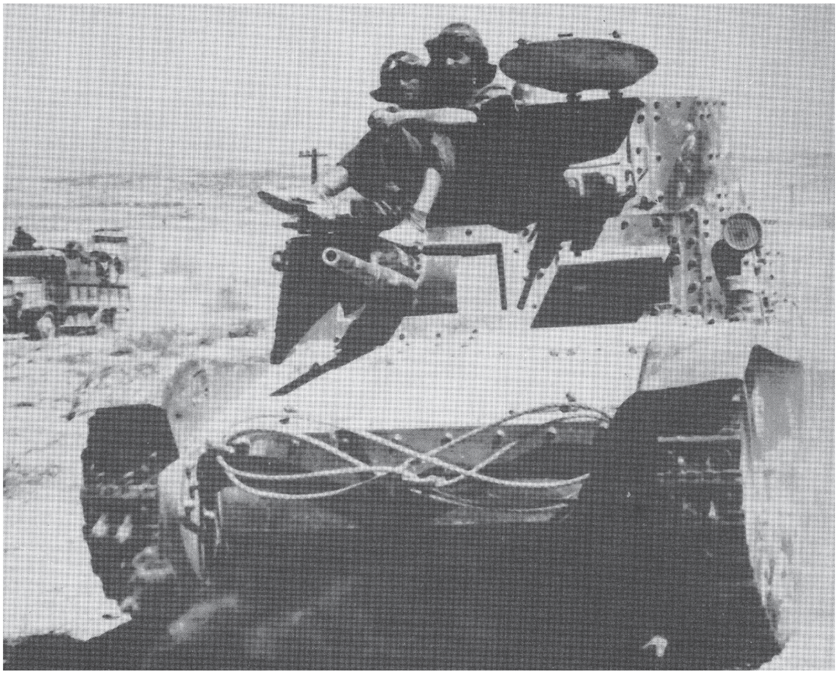
transferring units to reinforce Generale d'Armata Italo Gariboldi's 10ª Armata, which became the primary Italian field force in North Africa.

In terms of armour, there were three battalions (IX, XX, XXI), each with 43 CV-35 tankettes attached individually to different corps, to be used in the infantry support role. Enough tankettes were available in storage in Libya to form four additional light tank battalions (LX, LXI, LXII and LXIII battaglioni carri leggeri), using surplus personnel as crews, but these units were essentially untrained. While the seven light tank battalions stationed in Libya (with a total of 301 CV-35 tankettes and 38 spares) seemed to be a credible armoured force, they were initially dispersed and not trained or organized for offensive action. Although the Stato Maggiore had known since late 1939 that war with Britain was inevitable, it had not thought to transfer any of the new armoured or motorized divisions to Libya prior to the declaration of war. Consequently, the Comando Supremo hurriedly decided to dispatch two battalions from the 'Ariete' division, equipped with the new M11/39 medium tanks, to Libya in early July 1940. A heavily escorted convoy delivered the I and II Battaglioni Carri Medi (I.II./Btgl. Carri. M.) to Benghazi on 8 July, along with a large amount of fuel and supplies. Local Italian commanders described the M11/39 tanks as '*che sono magnifici*' (they are magnificent).[1]

An Italian medium tank battalion (*battaglione carri medi*) in 1940 was supposed to consist of a headquarters element and two tank companies, each consisting of three platoons with five medium tanks. On paper, the M battalion was authorized about 400 personnel, 37 medium tanks and about 20 trucks. In addition, the Italian medium tank battalion had a repair platoon with about 20 personnel, with a Lancia 3RO Field Workshop Model 1938 and a Dovunque light wrecker. In reality, very few of the support personnel in 1940–41 were trained mechanics.[2] Since the 'Ariete' division sent both its existing medium tank battalions to North Africa as independent battalions – a poor decision in itself – the division would not be able to deploy until the end of 1940.

Italian mechanized operations in North Africa were directly influenced by operational-level logistics, which determined exactly how much ammunition, fuel and reinforcements could arrive in theatre. At the start of the war, the Italian merchant marine had 31 merchantmen (only 20 of which could carry tanks), 5 fast troop carriers and about a dozen tankers it could use to support the maritime supply route from Naples to Tripoli and Benghazi.[3] Even without enemy interference, the ports of Benghazi and Tripoli were barely adequate to handle enough shipping to meet the army's minimum logistic needs. The loss of even a few merchant vessels to enemy action could have serious consequences for the Axis forces in North Africa, particularly when tankers were lost. As Heinz Guderian aptly noted, 'logistics are the ball and chain of armoured operations'.

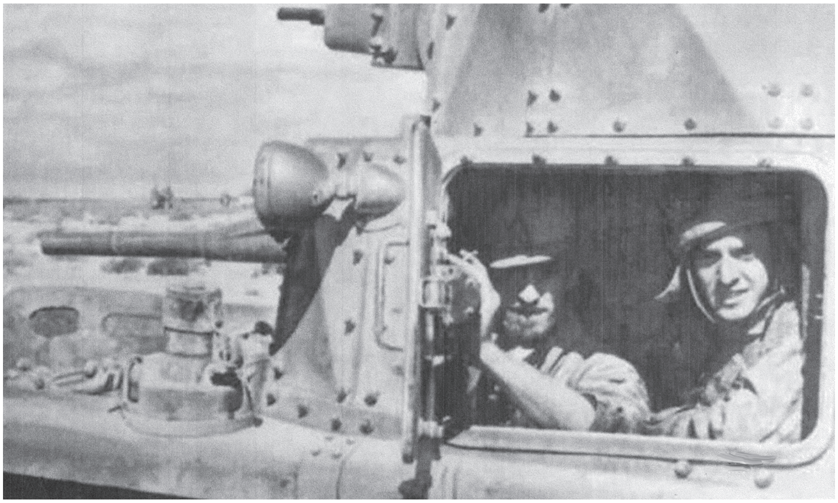
Italian ignorance about enemy armoured capabilities also impacted the performance of their mechanized forces in North Africa. In April 1940, the Germans offered to send Oberst Ritter von Thoma to Rome to brief Italian officers on lessons learned from armoured operations in the Polish campaign – but Mussolini rejected the offer.[4] The Germans obviously knew quite a lot



As an interim solution, Fiat was able to produce 100 M11/39 medium tanks in 1939 and 1940. Armed with a hull-mounted, low-velocity 37mm gun, the M11/39 was obsolete by the time that it first saw combat in North Africa. (Author's Collection) about the British Matilda II and Cruiser-series tanks by the time that Italy entered the war, but it does not appear that Italian military intelligence (Servizio Informazioni Militari or SIM) asked for any of this information. As a result, Italian mechanized units in North Africa were unaware that their existing artillery and anti-tank weapons were ineffective against the Matilda II tank. Indeed, Italian troops in North Africa at the outset of the war were provided negligible information about the enemy or his intentions.

Mussolini wanted the 10ª Armata to invade Egypt as soon as possible, but in fact no plans had been developed for this mission prior to hostilities. Maresciallo Rodolfo Graziani, the theatre commander, reluctantly began to organize his forces for offensive action, but kept badgering Rome with requests for more trucks, more artillery and more fuel.[5] While Italian doctrine spoke glibly of *guerra lampo* (fast war) when facing colonial opponents, the 10ª Armata in Libya was only capable of mounting a ponderous, methodical operation after three months of preparations. In order to provide a spearhead formation for the Egyptian campaign, Graziani concentrated all the available armoured assets into the Libyan Tank Command (Comando Carri Armati della Libia) under the command of Generale di Brigata Valentino Babini on 29 August 1940. The 50-year-old Babini was an excellent choice, given that he had 12 years of experience with tank units, plenty of colonial experience in Libya and recent combat experience with the CTV in Spain. Babini's new command included:

- Colonnello Pietro Aresca's I Raggruppamento Carristi (1st Tank Group), consisting of the I Battaglione Carri Medi (1st Medium Tanks Battalion) and the XXI, LXII and LXIII light tank battalions (*battaglione carri leggeri*).
- Colonnello Antonio Trivioli's II Raggruppamento Carristi (2nd Tank Group) with the II Battaglione Carri Medi (minus one company) and the IX, XX, LXI light tank battalions.

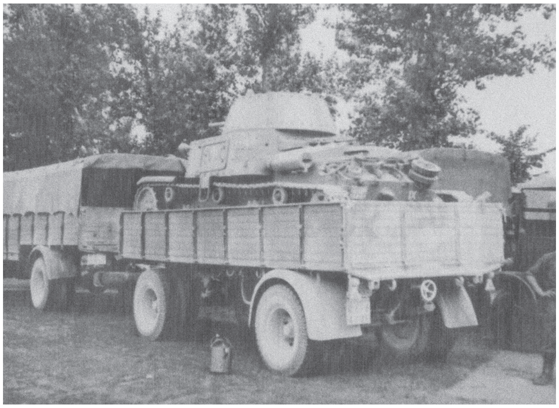


Italian *carristi* (tankers) inside an M11/39 medium tank. Italian tank crews were provided negligible training time in 1940 before being thrust into combat with inferior vehicles and no radios. (Author's Collection)

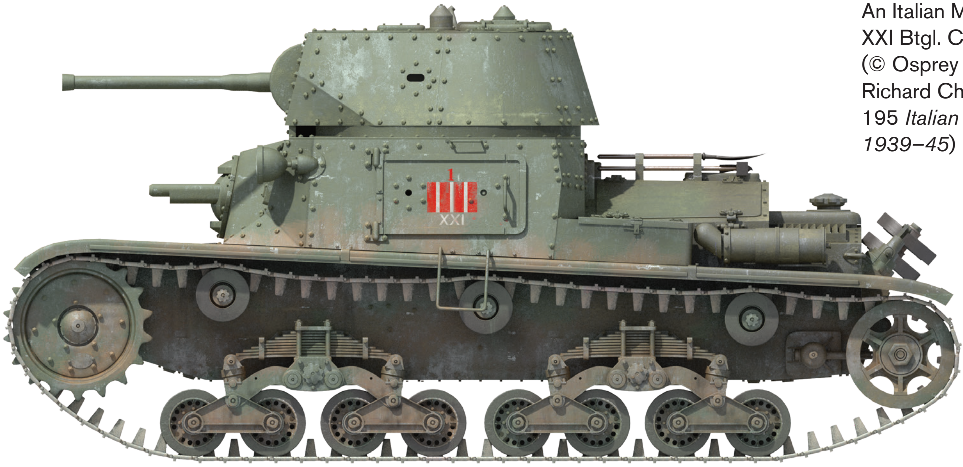
- Generale Pietro Maletti's Raggruppamento Maletti (Mobile Group), consisting of one company of M11/39 medium tanks, the LX light tank battalion and the desert-trained motorized I Battaglione Sahariano (Saharan Battalion, equipped with Fiat AS 37 and Fiat 634 trucks).

Aside from the technical deficiencies of Italian tanks, the Regio Esercito's armoured units were poorly equipped for manoeuvre warfare in North Africa due to their lack of radios and logistic support. Since neither the CV-35 tankettes nor M11/39 medium tanks had radios, tank companies were directed by signal flags – which made night operations virtually impossible. Italian armoured units had very limited repair and retrieval capabilities, particularly for the new M11/39 medium tank. Each tank battalion generally had one fuel truck (up to 5,000 litres' capacity), but the tankettes used petrol while the medium tanks used diesel fuel. In July 1940, the 10ª Armata had 2,400 trucks but 30 per cent were non-operational, which severely limited the ability to support a large ground operation into Egypt.

In terms of tank tactics, Italian commanders were still entrenched in a colonial and infantry support mindset, which rendered effective combined arms difficult to execute. Furthermore, the mass of Italian tankettes lacked the firepower to engage enemy gun-armed tanks, so defence and reconnaissance were really the only suitable roles. Indeed, the thin armour on the CV-35 could barely withstand fire from heavy machine-guns. Italian armoured units equipped with medium tanks could be more aggressive, when circumstances were favourable, but were not provided the requisite support assets until mid-1941. Lacking a



Italian tanks did have the advantage that they could easily be moved by truck, which saved on wear and tear in North Africa. The Regio Esercito also had a fleet of diesel-powered four-wheel drive trucks that were well-suited to off-road movement in the desert. (Filippo Cappellano)



An Italian M13/41 tank from the XXI Btgl. Carri M., January 1941. (© Osprey Publishing Ltd, by Richard Chasemore. From NVG 195 *Italian Medium Tanks: 1939–45*) turret-mounted gun, the M11/39 had difficulty engaging moving enemy tanks and its obsolescent 37mm gun was greatly inferior to the British 2-pdr gun. While the introduction of the M13/40 medium tank in July 1940 improved the ability of Italian armoured units to engage enemy cruiser and light tanks, it did not put them on an equal footing. Furthermore, production of the M13/40 tank was restricted to just 30–40 tanks per month in 1940 and would not ramp up until 1941. Once it became clear that the enemy had better quality weaponry – and more of it – Italian tactics became even more risk-averse.

It is also important to note that Italian armoured units lacked the *esprit de corps* of their opponents in the Royal Armoured Corps or their allies in the Panzerwaffe, given how most tank battalions were hastily trained, equipped and sent off to North Africa. In late 1940, a conversion course was established at Bracciano outside Rome to train personnel from tankette-equipped battalions on the new M13/40 tank. However, the 25-day curriculum provided only a few hours of actual driving training and a weapon's familiarization firing, but no actual tactical training. Conscripts and junior officers were provided with a steady diet of bellicose Fascist rhetoric, but an insufficient amount of technical and tactical training to give them confidence in their armoured vehicles. As a result of these intrinsic deficiencies, Italian armoured units in North Africa in 1940 were really only suited to defensive operations.

BRITAIN'S ARMOURED FORCES IN THE MIDDLE EAST

Lieutenant General Sir Archibald Wavell arrived in Egypt in August 1939 to take over the Middle East Command and begin preparing it for possible hostilities with Italy. Wavell was responsible for defending an enormous amount of territory, including Egypt, Palestine, Transjordan, Sudan and Aden, and he had very limited forces. In Egypt, there were approximately 36,000 troops, although many were garrison and support personnel. Britain had signed a treaty with Egypt in 1936 which limited its forces in country to just 10,000 personnel, but this constraint was ignored in the lead-up to hostilities (which created considerable ill-will in Egypt). The only real ground combat capability in the region resided in Hobart's incomplete Armoured Division (Egypt) and two infantry brigades. Hobart's division consisted of two small armoured brigades with a total of only 65 operational tanks of all types, no support group and minimal logistic units. The first A-9 cruiser tanks arrived in Egypt just before the outbreak of war and were assigned to the 6 RTR. By 25 August 1939, the 6 RTR had 39 tanks: eight A-9s, 16 obsolete Mk II mediums and 15 Mk VIb light tanks.[6] The 8th Hussars (8H) only had one squadron of light tanks and two of armoured cars. The 7th Hussars (7H) had two squadrons of light tanks, which were a mixed bag of Mk III, Mk VIa and Mk VIb.[7] Although the priority for new equipment went to outfitting the BEF in France and the 1st Armoured Division in England, the War Office did begin sending a trickle of reinforcements to build up the units in Egypt.

An even more pressing problem for the Armoured Division was the shortage of motor transport, particularly off-road vehicles. At the outbreak of war in 1939, the division was short of about 200 trucks, which seriously limited its striking range.[8] A single track rail line from Alexandria to Mersah Matruh allowed the Royal Armoured Service Corps (RASC) to efficiently transport bulk supplies to this forward position, but in order to move further westward, virtually all supplies had to move by motor transport. Ideally, a RASC transport company with 120 3-ton trucks could move 360 tons of supplies over a distance of 55–60 kilometres. Supporting a single 1940 armoured brigade (3 battalions) would require at least 50 tons of supply per day during mobile operations. Extending this line of communications to the Libyan border would require four truck companies – which were not yet available. Many of the trucks that were available could not operate over soft sand or rocky desert tracks. Without adequate motor transport, the Armoured Division was only capable of short-duration jabs near the coast with both armoured brigades or longer operations with a single armoured brigade. The division also lacked transporters to save wear and tear on its tanks, as well as recovery vehicles to retrieve damaged vehicles from the battlefield.

The crew of an A-9 cruiser tank from 1 RTR in Egypt, May 1940. The A-9 had two mini-turrets equipped with machine-guns, but this led to a very crowded arrangement. In the field, crews did not use the sub-turrets. (IWM, E 100)

All British armoured strength in Egypt was tied to the RAC depot at Abbassia, in Cairo. In Abbassia, the Royal Army Ordnance Corps (RAOC) conducted vehicle maintenance and repair. Any new tanks arriving by sea from England dis-embarked at Suez, 120 kilometres east of Cairo, and were then brought to Abbassia to make ready for operational use. Hobart deployed the Armoured Division to Mersah Matruh, 400 kilometres west of Cairo, where it could serve as a covering force if Italy should enter the war. During September–October, Hobart ensured that his units trained under realistic desert conditions, which helped to transition it from a peacetime mentality.

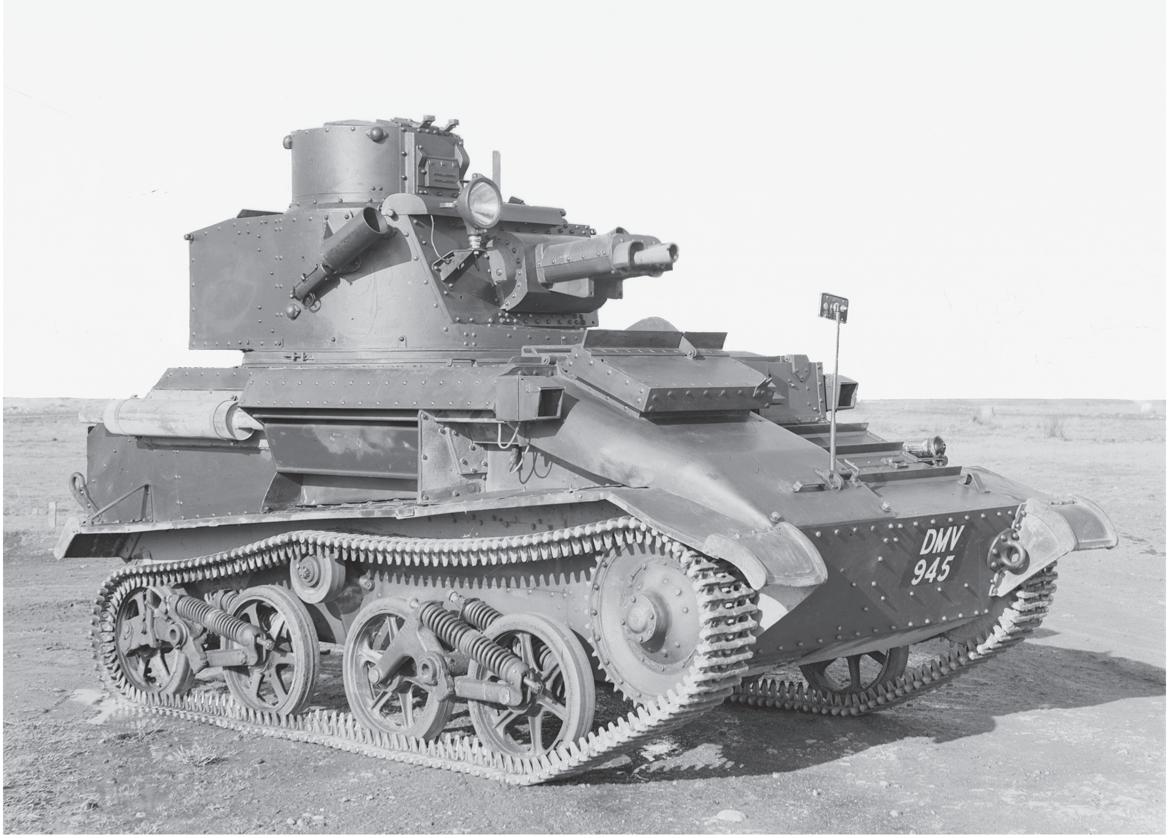
However, Hobart was relieved of command in November 1939 by Lieutenant General Henry M. Wilson, commander of British forces in Egypt. Hobart's abrasive behaviour with other officers had not won him any allies outside the RAC and Wilson pointedly noted that 'his tactical ideas are based on the invincibility and invulnerability of the tank to the exclusion of the employment of other arms in correct proportion'.[9] Hobart was replaced by Major General Michael O'Moore Creagh, a cavalryman, who had been at Tidworth in 1928. Brigadier John A. L. Caunter commanded the Heavy Brigade with 1 RTR and 6 RTR; Caunter was an experienced tanker who had commanded the 1 RTR in Egypt since 1935. Brigadier Hugh E. Russell commanded the Light Brigade, with the three mechanized cavalry regiments (7, 8, 11 Hussars). The division included a number of other officers with significant experience in armour, including Colonel Alexander Hugh Gatehouse, who had commanded a tank at the Battle of Cambrai in 1917 and was later in charge of testing new tanks at the MWEE in Farnborough in the 1930s. Colonel Horace L. Birks was another veteran tank officer, who had commanded tanks at Passchendaele and Cambrai.

Despite the fact that the Armoured Division was desperately short of personnel, the War Office directed Creagh to send trained tankers back to the United Kingdom to help train armoured units going to the BEF. The 6 RTR was obliged to send 4 officers and 50 other ranks back as a training detachment and received untrained Territorial Army (TA) troops as replacements. Other personnel replacements for the 7th Armoured Division came from Rhodesia and New Zealand. Additional tanks gradually arrived and by January 1940 the 6 RTR had 23 A-9 cruiser tanks. Unfortunately, no spares were sent for the A-9s, which left them in a fragile state. On 16 February 1940, the division was re-designated as the 7th Armoured Division; the Heavy Brigade became the 4th Armoured Brigade and the Light Brigade became the 7th Armoured Brigade. A small Support Group was created, under the command of Brigadier William E. 'Strafer' Gott, based upon his mechanized infantry battalion, the 1 KRRC (1st Battalion King's Royal Rifle Corps) and a single battery of artillery. Initially, the 7th Armoured Division had completely inadequate logistic support, with just one RASC company to transport fuel, ammunition and water. Since no companies were attached from the RAOC, which was responsible for vehicle maintenance and repair, the 7th Armoured Division had negligible ability to repair its tanks and other vehicles at the front. Instead, RAOC units in pre-war Egypt were only configured to operate from the Abbassia depot, which was over 400 kilometres from Mersah Matruh.

General Wilson, commander of British forces in Egypt, was most interested in seeing what the 7th Armoured Division could do and decided to hold a large-scale field exercise. Consisting primarily of long, dusty road marches, the field exercise succeeded in causing all of the new A-9 tanks to fall out with mechanical defects, which could not easily be corrected. Without adequate logistic support, the 7th Armoured Division was exceedingly fragile. Another serious weakness revealed in early desert training was that the 18-litre container used for refuelling and water supply – referred to by the troops as a 'flimsy' – was poorly manufactured and prone to leaking. Indeed, when RASC transport columns tried to move trucks with these fuel containers over rough desert tracks, up to 30 per cent of the contents were lost en route – which put further strain on British tactical logistics.

Authorized strength for a British mixed armoured regiment (which was actually a battalion-size unit) in 1940 was about 49–50 tanks (24 light, 23 cruiser, two CS), but the 7th Armoured Division did not conform to standard tables or organization and equipment. The armoured regiments consisted of headquarters element and three manoeuvre squadrons (companies), each of three troops (platoons). Since the tank troop (platoon) consisted of three tanks, each tank squadron (company) was supposed to consist of 16 tanks, but in 7th Armoured Division this was not always the case in 1940.[10] Although it authorized 500 personnel, typical regimental strengths at this stage were about 400, of whom only about half were actually tankers. The tanks and other organic or attached combat equipment, such as armoured cars and anti-tank guns, consisted of the 'F-echelon' or fighting element. A large portion of the regimental strength resided in the support echelons; each company/troop had an A-echelon (the 'company trains' in US Army jargon) with nine trucks (e.g. Bedford MWD 15-cwt and Bedford OY 3-ton) that carried extra fuel, food and ammunition for the F-echelon. The A-echelon typically remained several kilometres back from the forward line of troops and only moved forward at dusk to resupply their companies. The armoured regiment also maintained a B-echelon with 13 trucks that was supposed to act as a go-between from the RASC forward supply dumps to the A-echelon. The B-echelon tended to operate more in the brigade and division-level support areas and also provided repair workshops, spares and other higher-level logistic support functions for its regiment.

The 1940 British armoured division was particularly anaemic in terms of organic support units. On paper, the division support group was supposed to have two motor battalions and one Royal Horse Artillery (RHA) regiment with 16 towed field guns, two towed anti-tank batteries (each with 12 2-pdr guns), two anti-aircraft batteries (each with 12 40mm guns) and one truck-mounted engineer squadron with about 150 sappers. In reality, the 7th Armoured Division in Egypt had only a single motor battalion at first and few anti-tank guns. While the motor battalions had a nominal manpower



The Mk VIb light tank was the most numerous British tank in Egypt at the start of the campaign in 1940. Although the Mk VIb was superior to the Italian tankettes, it was highly vulnerable to Italian artillery and anti-tank guns and could really only be used in reconnaissance and pursuit roles. By the time that the Afrika Korps arrived in early 1941, the Mk VIb was clearly obsolete. (IWM, KID 195)

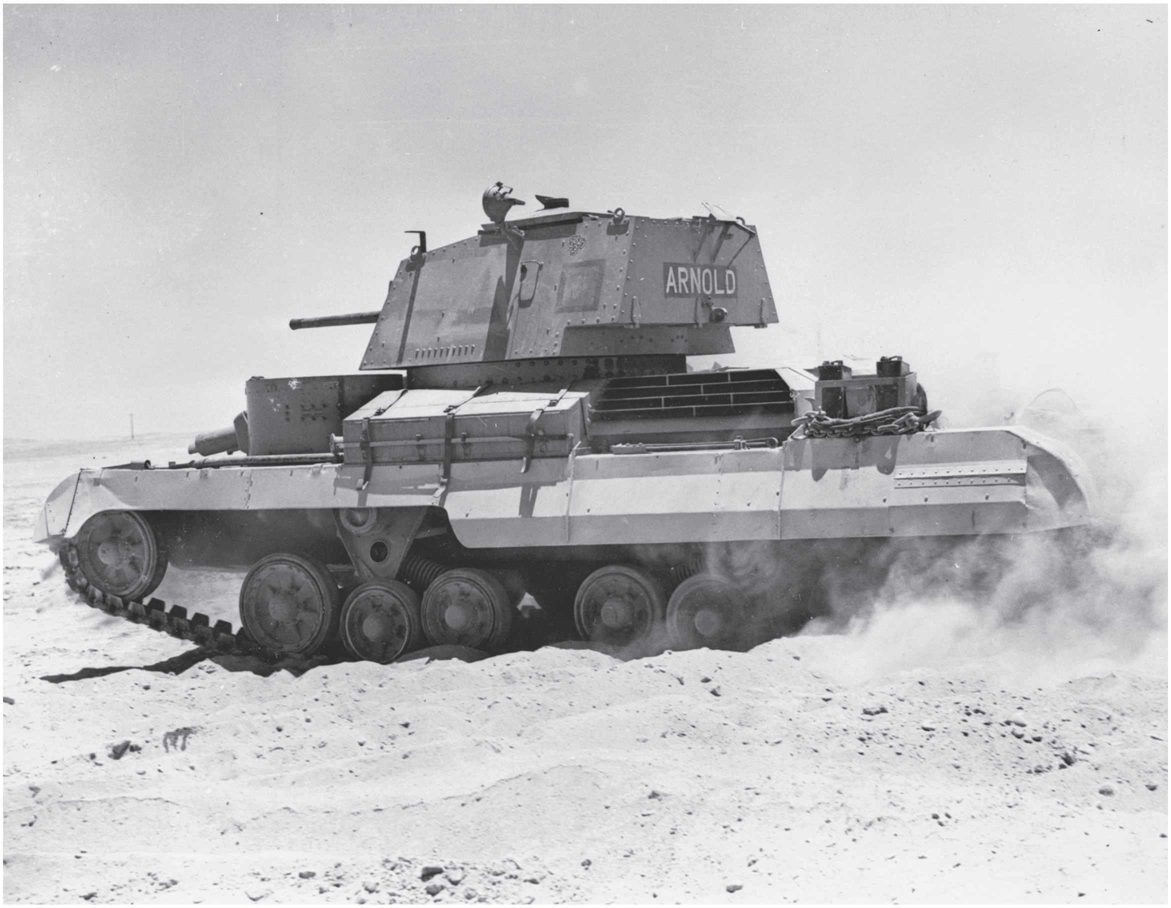
strength of 650, their actual bayonet strength in terms of infantry was about 360. A few universal carriers were available in Egypt, but most of the motor battalion relied on 15-cwt trucks for transport.

By the time of the Italian declaration of war in June 1940, the 7th Armoured Division had a total of 175 light tanks (Mk III and Mk VIb), 75 A-9 cruiser tanks and 91 armored cars (44x Morris CS9, 47x Rolls-Royce Pattern 24).[11] A number of A-9s were not combat-ready, lacking 2-pdr guns, machine-guns and/or radios. Even the light tanks were handicapped by shortages of .50 cal. (12.7mm) ammunition. Although the bulk of the gun-armed A-9 tanks were in 1 RTR and 6 RTR, Creagh ensured that the 7th and 8th Hussars each received enough cruiser tanks to equip one squadron. Lieutenant Colonel John F. B. Combe's 11th Hussars, equipped solely with armoured cars, served as an independent divisional cavalry unit. The Western Desert Force was created under Lieutenant General Richard O'Connor to command the mobile forces of Egypt, which now consisted of 7th Armoured Division and the 4th Indian Division, plus some corps artillery. Given the limited forces available and inadequate logistics, O'Connor was forced to remain on the defensive at the start of the war with Italy, although limited raids into Libya were feasible.

In England, Prime Minister Winston Churchill was eager to reinforce Wavell's Middle East Command in order to shift to an offensive posture against the Italians. The only major armoured unit in England was the 1st Armoured Division, which was still rebuilding from its heavy losses in France. Despite the threat of enemy invasion, Churchill's War Cabinet voted on 13 August 1940 to send one armoured brigade from the division to reinforce the 7th Armoured Division in Egypt as part of Operation *Apology*. The brigade consisted of three armoured regiments; the 7 RTR (with 50 Matilda II infantry tanks), the 2 RTR (with six A-9CS, 28 A-10s and 18 A-13s) and the 3rd Hussars (52 Mk VIb light tanks). In addition, the *Apology* convoys (designated AP1–AP3) would bring other equipment, such as AEC 850 R6T tank recovery vehicles and the first tank transporters to Egypt. The first vessels left Liverpool on 22 August and by early October the armoured brigade had reached Suez. No sooner had this brigade reached Egypt than Churchill directed another armoured brigade, with 3 RTR and 5 RTR, and the 2nd Armoured Division headquarters to sail for Egypt, as well.

Additional units training in England were also earmarked for eventual deployment to the Middle East and North Africa. The 2nd Armoured Division had begun forming in England in early 1940 but was handicapped by shortage of equipment and forced to train its personnel on trucks and armoured cars for much of the year. Major General Justice Tilly, an experienced armour officer who had commanded the pre-war 1st Armoured Brigade, was brought in to shape the new formation, which gradually began to acquire some cruiser and light tanks. The 3rd Hussars and 2 RTR were stripped from the division in September and sent on the first *Apology* convoy, which deprived Tilly of his best trained and equipped armoured regiments. Then the rest of the division was alerted for deployment to the Middle East in October 1940, even though it was far from ready for active service. Britain's Territorial Army (TA) had been greatly expanded in size during 1938–39 and a number of infantry battalions units began converting to armoured regiments. The RTR added 12 new regiments, most of which would be sent to North Africa in 1941–42. The TA also began converting 12 of its yeomanry (cavalry) regiments into armoured regiments, several of which would also be sent to North Africa. Given that the British Army had no other theatre of war that required substantial armoured forces – unlike the Germans – British forces in North Africa would enjoy a steady stream of armoured reinforcements arriving in theatre throughout the three-year campaign. Furthermore, the steady growth of British armoured strength in North Africa meant that veteran regiments could be pulled out of the line to rest, while new units took their places – a luxury that the Afrika Korps could not afford with its handful of Panzer battalions.

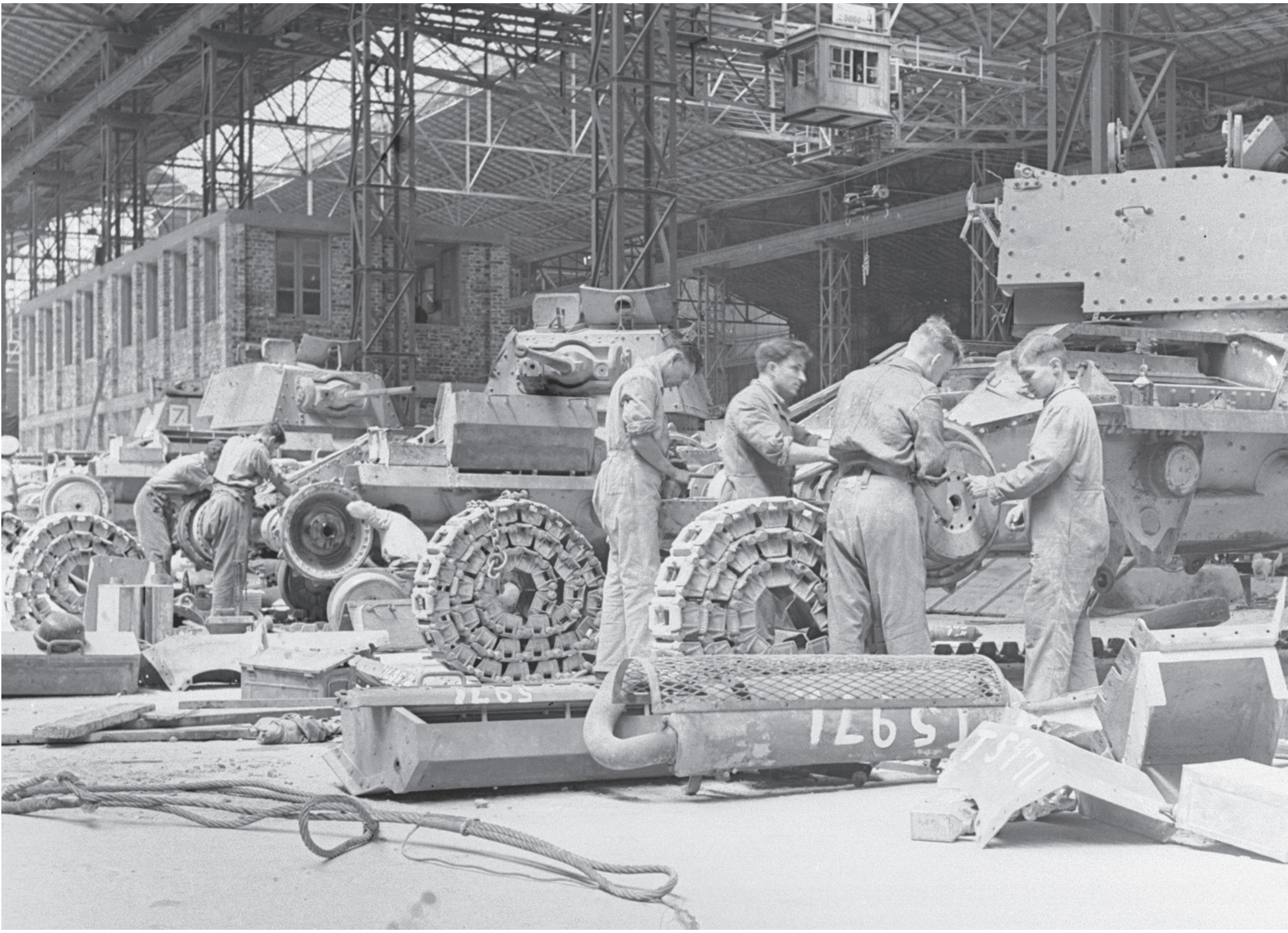
British tank tactics in 1940 were split between using heavily armoured infantry tanks to support conventional attacks and the use of highly mobile cavalry tactics by regiments equipped with cruiser and light tanks. In movement to contact, British armoured regiments in the desert usually advanced in a one-up formation (wedge), with one company of light tanks



One of 1 RTR's A-9 cruiser tanks in Egypt, summer 1940. The A-9 proved mechanically unreliable and in one pre-war exercise near Cairo, every one of the new cruiser tanks was sidelined with a variety of technical complaints. (IWM, E101)

in the lead, followed by the other two tank companies, then any support elements. British tankers liked to spread out in the desert, meaning that the frontage of a single squadron might easily be 1 kilometre across and that of the entire regiment 3 kilometres across. Each cruiser-equipped squadron was supposed to have two combat support (CS) tanks equipped with a 94mm howitzer to fire smoke rounds, plus two more belonging to regiment, although no unit in Egypt had its full complement of CS tanks in 1940. The 2-pdr gun possessed excellent armoured penetration for the battlefield of 1940–41 and could defeat all enemy tanks in theatre out to ranges of 800 metres or better. Although many sources claim that the 2-pdr gun lacked an HE round, this was not entirely accurate. Before the war, a 2-pdr APHE (Armour Piercing High Explosive) round with a small burster charge was developed and some rounds were issued, but production was discontinued in mid-1940.[12] Instead, British tankers were taught to rely upon their Besa machine-guns to suppress enemy anti-tank guns, but only ball ammunition was issued – which could not penetrate gun shields. Influenced by pre-war manoeuveres in England and Hobart's vehement advocacy of this tactic, British tankers also often tried to fire on the move, although this was highly inaccurate and consumed a great deal of ammunition.[13] As a former tanker myself, I can attest that shooting on the move is difficult even with modern tanks and only worked when tanks were moving at very low speeds (8kph or less) on flat ground. The preferred tactic is overwatch, with one armoured section moving at high speed while the other section sits in hull-down positions, ready to place accurate fire on any enemy reaction. Tank charges with wild firing could be effective in spooking some infantry units in 1940 due to the limited amount of organic anti-tank capabilities, but usually failed miserably when attempted against steady, well-armed units. The main problem with British armoured doctrine – unrecognized in 1940 – was the low level of tank-infantry cooperation and the lack of effective fire support from artillery and the RAF.

British cruiser tanks under repair at the Abbassia tank depot in early 1941. The availability of an in-theatre tank repair facility with modern workshops gave the British 8th Army a huge long-term advantage. (IWM, E2596E)



Another serious problem for the conduct of British armoured operations was the lack of sufficient radios, trained signal personnel and an insouciant attitude among senior leaders about communications security. Until 1942, British armoured units in North Africa were dreadfully short of radios, meaning that the loss of even a few command vehicles could cause effective command and control (C2) to collapse. The Royal Signal Corps had been starved of funds and resources before the war, which translated into real C2 problems in the first two years of the Desert War; oftentimes, forward regiments and brigades were out of contact for many hours. Furthermore, the lack of a secure tactical communications system, like the German Enigma, meant that armoured units did most of their communications either in the clear or via uncoded plain-text W/T (wireless telegraphy). Adding to that technical deficiency, the poor communications security used by senior British commanders enabled an alert enemy to acquire advance warning of British armoured operations.[14]

Yet in order to function as a combined arms team, an armoured division must be more than just a collection of tanks and other support forces – it must have a division or corps-level staff that knows how to plan and conduct mechanized operations. O'Connor's Western Desert Force had no one on its staff with direct experience in planning armoured operations, but they did have a solid cadre of regular army officers, several with General Staff training. Colonel Charles H. Gairdner, the 7th Armoured Division GSO1 (chief of staff), was a cavalryman who had no previous experience with tanks and when he attended Staff College at Camberley in 1933–34, the British Army was still struggling to form and equip a single armoured brigade. Otherwise, the rest of O'Connor's senior staff were Camberley-trained infantry officers such as Brigadier John Harding, Brigadier Alexander Galloway and Brigadier Eric E. 'Chink' Dorman-Smith. These were all competent regular army officers who knew how to plan conventional operations, but in terms of armoured warfare they were neophytes. Yet what O'Connor's staff lacked in terms of technical experience, they made up for in terms of aggressiveness and willingness to close with the enemy.

O'Connor's staff also had another key advantage. Unlike the Italian forces in North Africa, British commanders were provided considerable intelligence on their opponents. Britain's intelligence services had cracked three of the six ciphers used by Italian army units in North Africa, which enabled a signals intelligence unit (SIGINT) to read a good amount of the enemy's communications in near-real time.[15] Furthermore, British armoured commanders were well aware of the technical limitations of the Italian CV-35 tankettes and obsolescent artillery, which encouraged an aggressive mindset during initial operations. The collection of a wealth of information about the Italian 10ª Armata's dispositions would play a key role in the planning and successful outcome of Operation *Compass* in December 1940.[16] Armoured forces are precision instruments, which achieve the greatest results when their manoeuvres are conducted based upon reliable intelligence about enemy strength and dispositions. Despite serious materiel and doctrinal limitations, the British armoured forces in North Africa in late 1940 were prepared to wage aggressive mobile operations when circumstances were favourable.

GERMAN ARMOURED FORCES

'The soldier is levied, clothed, a med, exercised,
he sleeps, eats, drinks, and marches, all merely to fight
at the right time and place.'[17]
Von Clausewitz

Prior to late 1940, the Wehrmacht never ever expected to conduct armoured operations in North Africa. In particular, the Panzer divisions were configured to rely upon nearby rail heads for logistic lines of communications and lacked the motor transport to sustain long-haul supply lines on their own. Sending a single Panzer division to operate in a remote theatre of war on its own simply did not fit into German operational-level methods. However, political circumstances dictated that the Wehrmacht would have to modify its doctrinal concepts in order to fulfill its assigned strategic mission in North Africa.

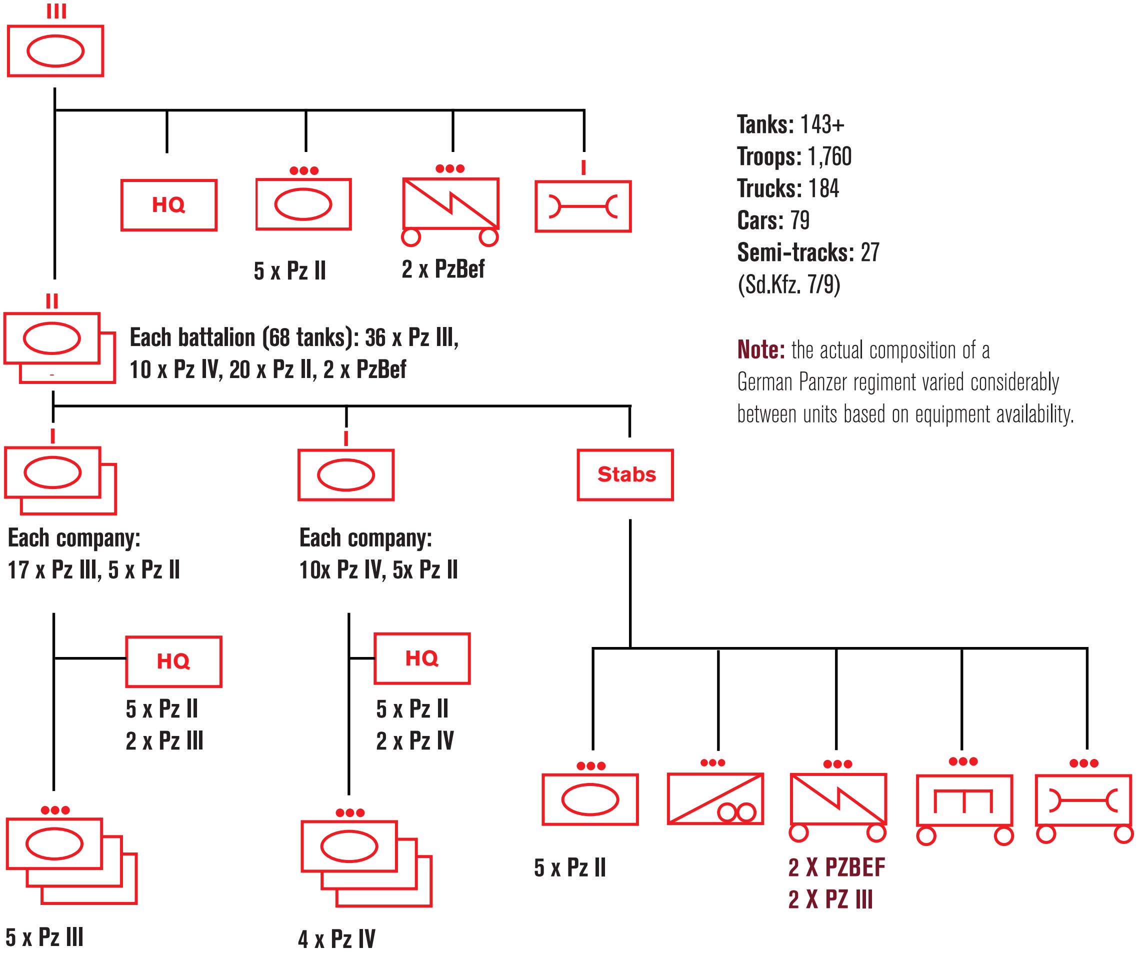
In mid-July 1940, the OKH began studying the idea of sending Panzer units to North Africa to support the Italian invasion of Egypt. On 31 July, the OKH suggested sending two Panzer divisions to North Africa, although this recommendation was not based on any real analysis.[18] While the OKW was pre-occupied with planning the invasion of England, Operation *Seelöwe*, the OKH had the time and staff to examine other projects, including Gibraltar and the Soviet Union. Hitler, who became increasingly uncertain about the prospects of success for *Seelöwe*, wanted other options available, but simply directed the OKH to study the Libya option and provide more data. As the deadline for *Seelöwe* approached and the Luftwaffe failed to achieve air superiority over the English Channel, Hitler authorized the OKH to make preparations to send one Panzer division to North Africa.[19] As a result, in early September the 3. Panzer-Division received a warning order to prepare for deployment to North Africa, which the OKH staff estimated would require ten weeks to complete.[20]

Meanwhile, the Italian Comando Supremo was not comfortable about the idea of German combat units arriving in North Africa, which would likely prove embarrassing for Graziani's command. On the other hand, the Comando Supremo recognized that it would likely require military assistance from the Germans at some point and was thus reluctant to reject any German offers outright. Instead, the Comando Supremo suggested that it was preferable for the OKH to provide 150– 200 medium tanks to Italy in order that it could fully equip and send its own 'Ariete' Division to North Africa.[21] The OKH responded that it had no medium tanks to spare, but said it could provide captured French tanks to Italy, which temporarily halted discussions on this subject.

In mid-October 1940, the OKH sent Generalmajor Wilhem Ritter von Thoma, one of its most experienced Panzer commanders, to Rome to gather information about the theatre of operations. Von Thoma spent three days in discussions with the Italian army staff and returned to report to the OKH on 24 October (Hitler requested a personal briefing from von Thoma, as well), noting that the desert environment would prove a major logistical challenge for German Panzer forces and that the Italian 10ª Armata was ill-disposed toward any major offensive operations. At best, the Italian supply lines would be stressed to sustain a single Panzer division in Libya. Generalleutnant Friedrich Paulus, the Oberquartiermeister I of the OKH, pointed out that sending a single Panzer division to operate with the Italians made no sense because it would be too small a force to operate independently. On the other hand, a mechanized corps with three divisions might achieve useful results, but would require 80,000 tons of supplies just to begin operations in North Africa, with more to follow every month.[22] In Rome, the Comando Supremo decided to sit on the German proposals, since Mussolini hoped to achieve a tactical victory in North Africa at Mersah Matruh without help from his ally.[23] On 12 November, Hitler signed Führer Directive No. 18, which directed that one Panzer division would 'stand by for service in North Africa', but without Mussolini's concurrence the directive was essentially a dead letter.[24]

However, the situation changed quickly because of Operation *Compass* in December 1940. By 21 December, the Comando Supremo was urgently sending requests to the OKH for tank support, but now all German Panzer divisions were assigned to participate in Operation *Barbarossa*, the invasion of the Soviet Union. After its earlier proposals had been rebuffed, the OKH was now reluctant to help the Italians, but Hitler was unwilling to see his ally defeated in North Africa. Consequently, on 11 January 1941 he signed Führer Directive No. 22, *Unternehmen Sonnenblume* (Operation *Sunflower*), which authorized the transfer of a defensive covering force to Libya. The OKH decided to create a hybrid division designated as the 5. leichte-Division, rather than re-directing the entire 3. Panzer-Division to North Africa. Oberst Hans Freiherr von Funck's Pz.Regt. 5 (with two battalions) was the primary combat element of the hybrid division, but 3. Panzer-Division also contributed its reconnaissance battalion, its anti-tank battalion and one artillery battalion. The rest of the division was filled out with *Heerestruppen* (independent army-level battalions), including two motorized machine-gun battalions and Panzerjäger-Abteilung (Sfl) 605 (Pz.jg.-Abt. (Sfl) 605, equipped with 27 Panzerjäger I tank destroyers). The 5. leichte-Division was a very unbalanced formation, with emphasis on tanks and anti-tank weapons, but very little infantry or artillery. Although von Funck assembled the task force, Generalmajor Johannes Streich was given command of the 5. leichte-Division on 7 February 1941. Streich was a very experienced armour officer, having led Panzer-Regiment 15 (Pz.Regt. 15) in the Polish and French campaigns.

GERMAN PANZER REGIMENT ORGANIZATION, MARCH 1941


III
HQ
5 x Pz II
2 x PzBef
II
Each battalion (68 tanks): 36 x Pz III, 10 x Pz IV, 20 x Pz II, 2 x PzBef
Stabs
Each company: 17 x Pz III, 5 x Pz II
Each company: 10x Pz IV, 5x Pz II
HQ
5 x Pz II
2 x Pz III
HQ
5 x Pz II
2 x Pz IV
5 x Pz III
4 x Pz IV
5 x Pz II
2 X PZBEF
2 X PZ III

Tanks: 143+
Troops: 1,760
Trucks: 184
Cars: 79
Semi-tracks: 27
(Sd.Kfz. 7/9)

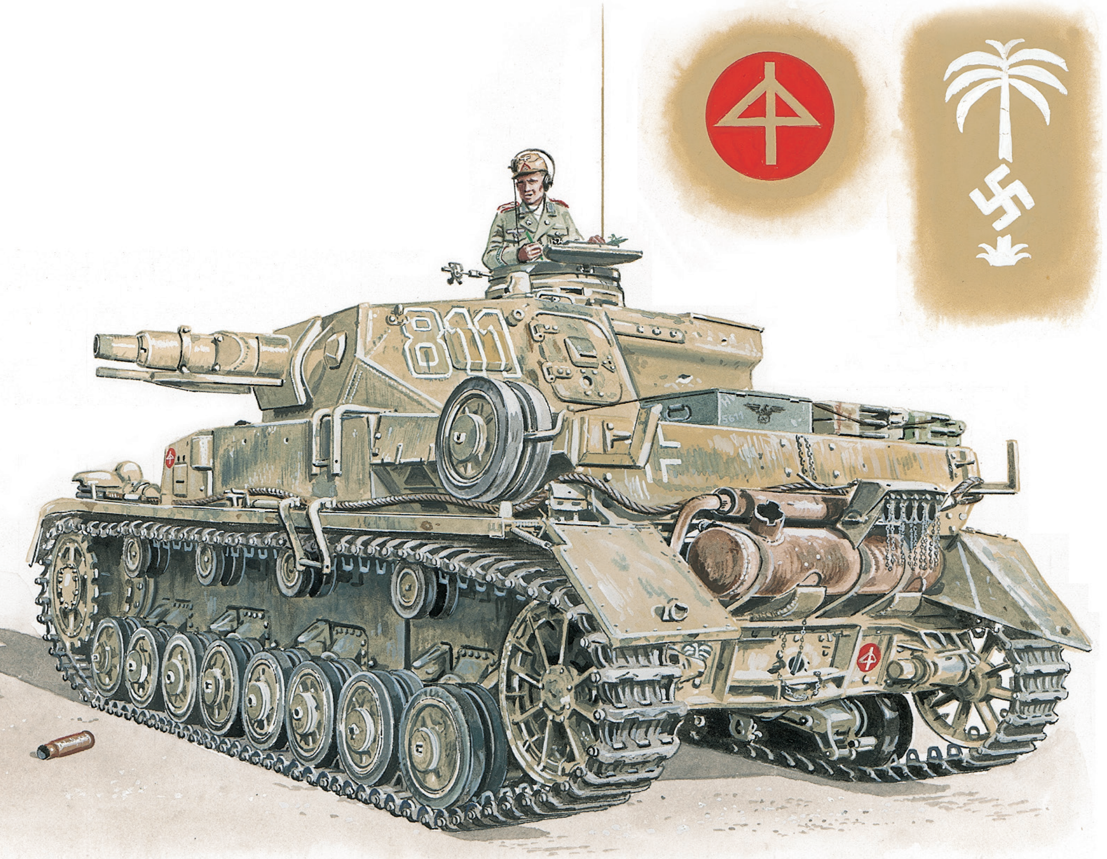
Note: the actual composition of a German Panzer regiment varied considerably between units based on equipment availability.

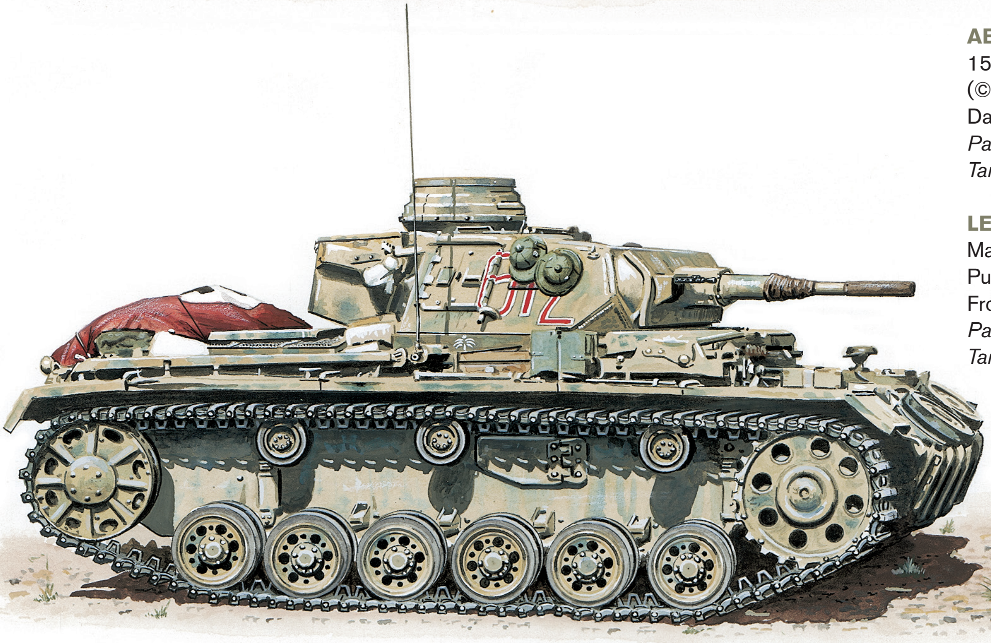
In addition to the 5. leichte-Division, the OKH decided to form a second armoured unit to deploy to North Africa, using the 33. Infanterie-Division as a base. By adding Panzer-Regiment 8 (Pz.Regt. 8) from the 10. Panzer-Division and a large amount of motorized transport, a mundane infantry formation was transformed into the 15. Panzer-Division in just a few months. The 15. Panzer-Division was a more balanced formation, with two tank, five infantry and three artillery battalions, plus normal allocations of engineers, reconnaissance and anti-tank support units.

On 18 February 1941, the German forces deploying to North Africa were designated as the Deutsches Afrika Korps (DAK) and Generalleutnant Erwin Rommel was assigned as commander. Although Rommel had put in an exemplary performance as commander of the 7. Panzer-Division during the French campaign, he had no prior experience with tanks and had never commanded anything larger than a battalion prior to 1940. While other officers had been gaining experience commanding tank battalions and regiments since 1935, Rommel had been guarding Hitler at the 1936 Nuremberg Nazi party rally and training Hitler Youth groups, along with brief stints commanding the Führer's escort unit.[25] Nor did Rommel have any General Staff or technical training, which made him poorly prepared to conduct operational-level warfare with mechanized units. In particular, he had little patience for intelligence and logistics and simply assumed that he could overcome all obstacles with his bulldozer approach to leadership. Despite efforts by historians to paint Rommel as apolitical and opposed to the Nazi regime, in fact Rommel clearly worked the system – through close contact with Hitler and other high-level officials like Josef Goebbels – to get the command assignments he wanted.

The first major German armoured unit to reach North Africa was Oberst Herbert Olbrich's Pz.Regt. 5, which had a total of 155 tanks (25 Pz I, 45 Pz II, 61 Pz III, 17 Pz IV, 7 Pz Bef), divided into two Panzer battalions and a Regiments-Stab (headquarters). The regiment also had an organic tank repair company (Panzer-Werkstatt-Kompanie), which, in addition to workshops, possessed a single Sd. Kfz. 9 recovery vehicle (FAMO). Each Panzer battalion comprised a headquarters company (Stabs-Kompanie), with 5 Pz II, I Pz III and 2 Pz Bef, two light companies (leichte Kompanien), each with 5 Pz II and 17 Pz III tanks, and one medium company (mittlere Kompanie), with 5 Pz II and 10 Pz IV tanks; altogether a total of 65 tanks (20 Pz II, 35 Pz III, 10 Pz IV). Platoons equipped with the Pz III medium tank had five vehicles, while those equipped with the Pz IV had four vehicles. In terms of combat support, the Panzer battalion had a motorized tank maintenance platoon (with eight trucks and five halftracks) and one leichte Kolonne (light supply column, with 18 trucks). The authorized personnel strength of the Panzer-Abteilung was about 760, which was significantly larger than a British armoured battalion.

Although short on infantry and artillery support, the 5. leichte-Division was provided with powerful support assets. The Luftwaffe I./Flak Regiment 33 had three *schwere* (heavy) batteries, each with six 8.8cm Flak 18 guns; these high-velocity weapons could destroy even the Matilda II tank out to 1,500 metres. The Panzerjäger I tank destroyers in Pz.jg.-Abt. (Sfl) 605 combined a Czech-made 47mm anti-tank gun on the chassis of a Pz I tankette, which proved to be an effective combination. The Germans also placed great emphasis on reconnaissance, and Aufklärungs-Abteilung 3 had about 40 armoured cars, some, like the Sd.Kfz. 222, mounting a 2cm gun. The German reconnaissance units proved better equipped than the British units, which still depended on lightly armed obsolescent armoured cars. The Luftwaffe also provided a close support package for the DAK, including two *Gruppen* (groups) of Ju-87 Stuka dive-bombers (I./St, G 1 and I./St, G 2) and one *Staffel* (squadron) of Bf-110 fighter-bombers (8./ZG 26).[26]





ABOVE German Pzkw IV Ausf E, 15. Panzer-Division, April 1941. (© Osprey Publishing Ltd, by David E. Smith. From NVG 28 *Panzerkampfwagen IV Medium Tank 1936–45*)

LEFT German Pzkw III Ausf G, March 1941. (© Osprey Publishing Ltd, by Mike Chappell. From NVG 27 *Panzerkampfwagen III Medium Tank 1936–44*)

The primary German tanks sent to North Africa in March 1941 were the Pz III Ausf G model and the Pz IV Ausf D/E models. With the Ausf G model, the Pz III was finally hitting its stride as a medium tank, possessing a good mix of firepower, mobility and armoured protection for the battlefield of 1941. Against the Allied tanks of this period, the 5cm Kw.K. 38 L/42 gun was capable of defeating all but the thickly armoured Matilda II at ranges up to about 1,000 metres. The Pz IV Ausf D, with its 7.5cm Kw.K. L/24 howitzer, had the ability to engage enemy anti-tank guns at a distance – a capability none of the British tanks possessed. Although the British 2-pdr gun (40mm) could defeat both German medium tanks at typical battlefield ranges, this declined when up-armoured versions of both tanks appeared early in 1941 (the Pz III Ausf H and Pz IV Ausf E). Unlike the Italian armoured units, all the German tanks were equipped with VHF radios, most with either the Fu2 or Fu5 short-range models. Battalion- and regimental-level command vehicles were equipped with the longer range Fu6 or Fu8 radios. German regimental and battalion-level commanders also had dedicated command vehicles (*Panzerbefehlswagen*), outfitted with extra radios, which enhanced their ability to co-ordinate fast-moving armoured operations on the battlefield.

While German logistical support was thin on the ground in North Africa, they did enjoy a few advantages. Unlike the British, the German army had put a great deal of effort into developing various ancillary equipment to support mechanized operations, including the famous Wehrmacht-Einheitskanister for field refueling. The pressed steel container (dubbed the 'jerry can' by the Allies) could hold 20 litres of fuel and proved extremely useful in North Africa. Each Panzer deployed to North Africa arrived with at least 6–8 of these fuel canisters mounted on their turrets. The Panzer Werkstatt (workshop) company within the Panzer regiment was capable of considerable field repair, including welding to repair damage and replacing faulty engines and transmissions. Unlike British armoured units, German Panzer units were already well-versed in battlefield recovery, which enabled them to recover both friendly and enemy vehicles after dark.

Although neither of the German armoured divisions deploying to North Africa had fought as complete units before, these ad hoc formations quickly gelled into veteran units with high *esprit de corps*. Superior tactics, doctrine, small unit leadership and reliable weapons gave the Afrika Korps Panzer units a considerable edge against their Commonwealth opponents in 1941 and 1942. However, the Afrika Korps was never intended to conduct a multi-year campaign in an austere environment or provide the means to win a protracted battle of attrition, which limited the scale of what it could actually accomplish.

CHAPTER 3

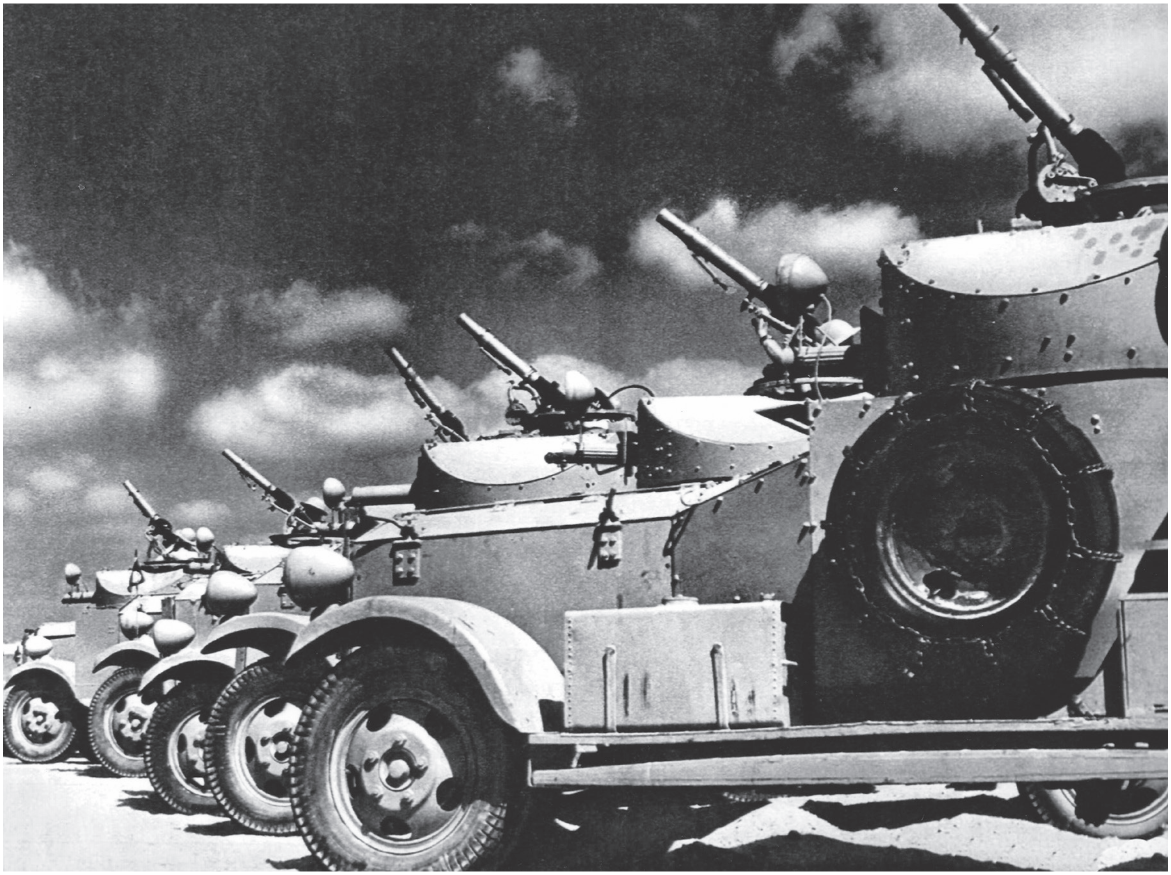
EARLY ARMOURED OPERATIONS IN 1940–41

BORDER SKIRMISHES, JUNE–AUGUST 1940

> *'The Mediterranean will be turned into an Italian lake.'*
>
> *Mussolini, 1940*

Once the Italians declared war, the British wasted no time in initiating hostilities across the Libyan-Egyptian border. During the counter-insurgency campaign against the Senussi in the early 1930s, the Italians had created a barrier on the Egyptian frontier known as 'the wire', which ran for over 600 kilometres; it consisted of four rows of single-strand barbed wire, secured by metal posts. The Italians had built several small stone forts to monitor the border area and Generale di Divisione Luigi Sibille's 1st Libyan Division (1ª Divisione libica), which reported to the XXI Corps, was responsible for manning the garrisons. Generale Gariboldi intended to keep most of his forces back from the border area to protect them from British attack, so the only armoured unit near the border was Colonnello Lorenzo D'Avanzo's IX Btgl. Carri L.).

O'Connor lacked the strength or logistic resources to mount an offensive, but he directed Creagh's 7th Armoured Division to conduct cross-border raids to harass the enemy and gather information on their dispositions. Creagh assigned the armoured cars of Lieutenant Colonel John F. B. Combe's 11th Hussars to penetrate the frontier wire in several places and send troop-size patrols into enemy territory on the evening of 11/12 June. Combe and his men took to the task with relish, scooping up about 70 unwary Italians and then returning to Egypt without loss. Emboldened by the lack of enemy resistance, Brigadier John A. L. Caunter decided to reinforce the 11th Hussars



The British Army in the Middle East in 1940–41 was still heavily dependent upon the obsolescent Rolls-Royce 1920 Mk I armoured cars for battlefield reconnaissance. Troops and squadrons were trained to operate independently across a dispersed area of operations. (Author's Collection)

with Lieutenant Colonel Geoffrey Fielden's 7th Hussars and conduct simultaneous attacks against some of the Italian border forts on the morning of 14 June. Fielden sent his A and B squadrons, supported by one company of the 1 KRRC, to attack Fort Capuzzo. The attack was also supported by RAF Blenheim bombers, which dropped bombs near the fort just prior to the ground attack (accuracy was poor and the bombs missed the target). Fielden's 7th Hussars conducted a pincer attack against Fort Capuzzo, while the British infantry dismounted at a distance of 1,400 metres and advanced on line. Two infantry carriers ran onto mines, killing one infantryman. After a brief show of resistance, the 226-man garrison surrendered.[1]

Meanwhile, Combe Force, consisting of B and C squadrons of the 11th Hussars (about 35 armoured cars), plus C Squadron of the 7th Hussars and one troop of four 25-pdr howitzers, had crossed the border into Libya at 0710 hours and headed past Fort Capuzzo toward the Italian fortified camp at Sidi Azeiz, 10 kilometres to the north-west. Apparently, the previous patrols by the 11th Hussars had failed to identify the strength of the enemy garrison at Sidi Azeiz; Gruppo Garelli consisted of one infantry regiment of the 1st Libyan Division, two companies from the IX Btg. Carri Leggeri with a total of

24 CV-35 tankettes and four artillery batteries (equipped with 77/28 guns). It was a strong position, made stronger by the fact that the Italians had also emplaced Vaudagna B2 anti-tank mines around their camp. As they approached the camp, the lead squadron of 11th Hussars came under fire from two 77/28 (76.5mm) artillery batteries at a range of about 5,000 metres.[2] While the armoured cars tried to skirt around the enemy position, Major Ronald F. G. Jayne, commander of C Squadron 7H, spotted an enemy infantry position on a nearby ridge and opted to attack immediately with his Mk VIb light tanks. Charging quickly to reduce their exposure to enemy artillery fire, one of Jayne's troops ran straight into a minefield and three Mk VIb light tanks were destroyed. Trooper Leslie L. Webb, from Sheffield, was the first British tanker killed in North Africa. Major Jayne succeeded in rescuing the crew of one of his destroyed tanks under fire from the enemy artillery. The British brought up their 25-pdr artillery troop to try and suppress the enemy guns, and engaged from maximum range – around 12,000 metres – which was well beyond the range of the Italian guns. However, at that range, the British gunners found that the shimmering heat rising from the desert made it impossible to adjust fire onto targets that were difficult to spot. After failing to make any progress, Combe decided to withdraw after 1200 hours. When the Italian garrison spotted the British pulling back, the commander committed one company of CV-35 tankettes to attack the 11th Hussar rearguard. Six CV-35s moved rapidly against B Squadron 11 H, but one of the armoured cars had a 14mm Boys anti-tank rifle, which it used to disable one of the tankettes and capture its two-man crew.[3] The attack on Sidi Azeiz had failed, primarily due to the lack of proper pre-battle reconnaissance and support assets. Nor did it help that a large number of A-9 cruiser tanks fell out *en route* to the objective, mainly due to fragile track pins which easily broke on the rocky desert terrain.

Most of the British mechanized units retreated back across the border, but part of C Squadron 11H was ordered to set up an ambush along the Bardia–Tobruk road. During the morning of 15 June, the five armoured cars in this group intercepted a number of small Italian convoys, resulting in Italian losses of 21 dead, 88 captured and 37 vehicles lost. The biggest prize was the capture of Generale di Brigata Romolo Lastrucci, the 10ª Armata's newly appointed chief engineer. However, the Italians identified the British roadblock and called in aircraft to attack the enemy armoured cars. Italian fighters strafed the British troop and managed to penetrate the turret armour on one Rolls-Royce armoured car – indicating the very limited protection of these obsolete vehicles. Unlike the RAF, which preferred to attack fixed targets (and the further back behind the front, the better), the Regia Aeronautica proved capable of finding and attacking moving targets in the desert – a legacy of their focus on counter-insurgency warfare.

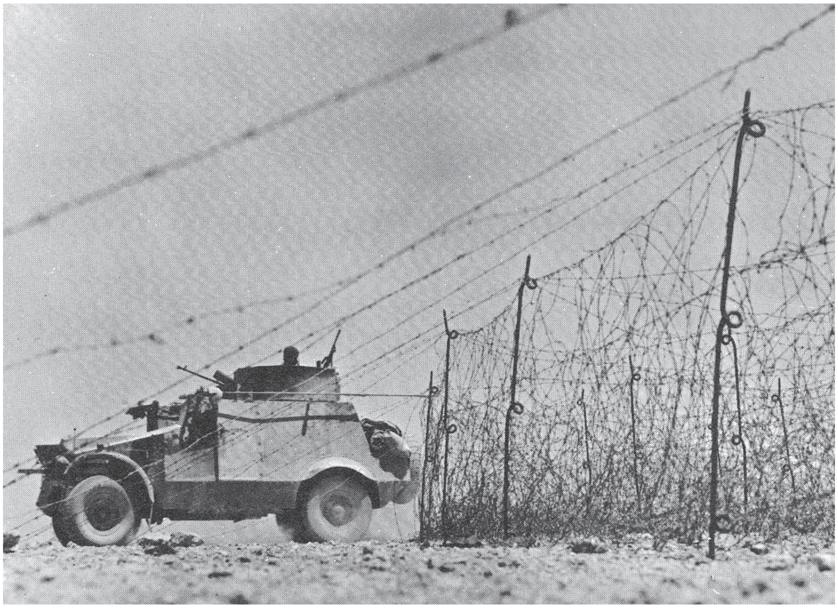
Generale Gariboldi was incensed about reports of British raids across the border and attacks on his border forts, so he ordered Sibille's 1st Libyan Division to send a battlegroup into the area south of Fort Capuzzo to deal with the enemy infiltrators. Colonnello Lorenzo D'Avanzo, commander of the IX Btgl. Carri L., was chosen to lead the column, which consisted of one battalion of Libyan infantry mounted in Lancia 3RO trucks, Capitaine Rizzi's 3rd Company of IX Btgl. Carri L. with 16 tankettes and a battery of four 77/28 field guns. D'Avanzo was an experienced armour leader, having previously commanded the 4th Tank Infantry Regiment in Rome and seen combat in Spain with the CTV. He advanced toward Ghirba, with one tankette platoon in the lead, followed by the infantry and artillery in the centre of the column and the rest of the tankettes in the rear.[4]

Early on the morning of 16 June, Second Lieutenant Warren V. H. Gape, with just two armoured cars from B Squadron 11H, spotted Raggruppamento D'Avanzo near Nezuet Ghirba and boldly decided to attack. Gape advanced rapidly, spraying the column with .303 (7.7mm) Vickers machine-gun fire. The Libyan infantry quickly dismounted, but their trucks drove off, leaving them stranded in the open. The Italian tankettes counter-attacked, forcing Gape to veer off. However, Gape plastered the lead Italian platoon, knocking out four tankettes. It is unlikely that the Vickers machine-gun fire penetrated the 15mm armour on the tankettes, but a large number of impacts at close range likely caused spalling, which could injure the crew. Despite this success, Gape was still badly outnumbered until several more British armoured cars arrived, causing the Italian tankettes to fall back toward their supporting infantry and artillery. Since a handful of armoured cars could not destroy an Italian battlegroup on their own, they called for reinforcements. Major D. C. Seymour Evans' A Squadron 7H soon arrived, with six A-9 cruisers and several light tanks. Rather unusually, the British commanders were able to observe D'Avanzo's column, which had deployed in the open, about 3 kilometres away and plan a deliberate attack. Around 1100 hours, the British advanced, with the two armoured car troops swinging wide around the Italian flanks in order to cut off their retreat, while Evans' tanks headed straight for the Italian column. Seven Italian tankettes vainly tried to counter-attack the approaching British tanks, but were shot to pieces – some at point-blank range.[5] The Italian *artiglieri* (gunners), led by Tenente Raffaele Bonanno, fired repeatedly at the British tanks with HE rounds, but their inability to traverse prevented them from scoring any hits on the moving tanks. In a complete break with standard tactics, the British tanks circled the Italian column twice, pouring machine-gun and cannon fire into it. Once Tenente Bonanno and his gunners were killed, the survivors tried to escape in the remaining vehicles, but the 11th Hussar armoured cars were waiting for them. Colonnello D'Avanzo was killed in his Fiat staff car by machine-gun fire, but a large number of survivors did escape.[6] The British had won a clear-cut tactical victory in their first tank versus tank action in North Africa. In the Battle of Ghirba, the Italians lost 16 CV-35 tankettes, four field guns and 13 trucks, plus over 50 killed and 101 captured. The British units had not suffered a single casualty.

Despite their tactical victory, the British noted several problems that the Battle of Ghirba exposed. Foremost, it was discovered during the action that the No. 9 wireless sets in the 11th Hussars could not communicate with the No. 11 wireless sets in the 7th Hussars – and this would not be the last time that British battlefield communications would be hampered by failure to check equipment and frequencies prior to combat. British gunnery was also found to be good at close range, but ineffectual at longer ranges. The A-9 cruisers should have been able to pick off the Italian tankettes at 600–800 metres, but this proved impossible. Italian gunnery was even more ineffectual, inflicting no serious damage. The initial encounters also reinforced a tank-heavy mindset in British commanders, inasmuch as detachments of infantry, artillery, engineers and anti-tank had not contributed much – tanks and armoured cars had sufficed. Nor did the lack of any air defence capability in the 7th Armoured Division seem to be a noticeable vulnerability, despite frequent enemy air attacks and the lack of RAF fighter support.

During the first month of the desert war, British senior officers also demonstrated a risky tendency to go 'swanning about' near the front line. On one evening, a patrol from the 11th Hussars was surprised to encounter an unescorted staff car, containing General O'Connor himself, approaching from Italian-held territory.[7] O'Connor's staff officers, such as Gairdner and Dorman-Smith, also made sudden appearances and tried to micro-manage junior front-line officers; this command style worked against the development of effective combined arms warfare.

After the destruction of Raggruppamento D'Avanzo, Gariboldi decided to rush more reinforcements to the border region and requested the Regia Aeronautica to concentrate on destroying the British armoured screening



A Morris CS9 armoured car from the 11th Hussars crosses the frontier wire into Libya soon after the Italian declaration of war in June 1940. Despite being equipped with obsolete vehicles, the 11th Hussars proved extremely aggressive in the covering force mission. (Author's Collection)

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A troop of Mk VIb light tanks from C Squadron 1 RTR on patrol near the Libyan-Egyptian border in early August 1940. British armoured units performed very well in the covering force mission, but it wore out their equipment rather quickly. (IWM, E 443)

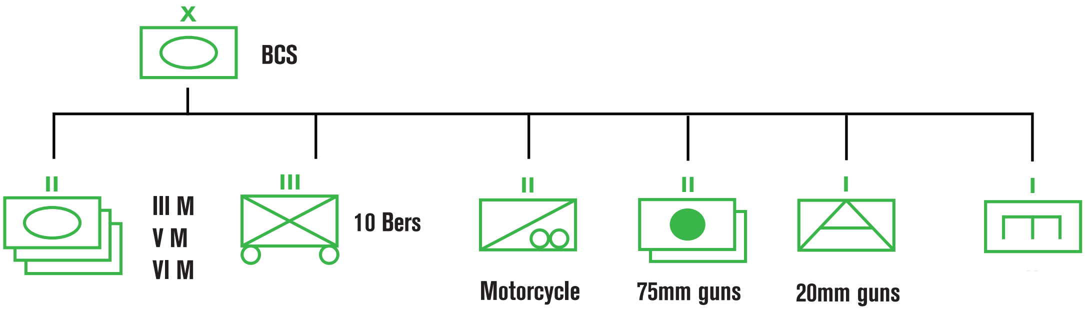
units that were operating west of the wire. By 24 June, Combe's 11th Hussars were under regular air attack and were no longer able to move large formations without being spotted from the air. While British histories tend to emphasize that the Italians were 'demoralized' by these early raids, in fact the British covering force action only achieved success in the first two weeks of the war. After that, the Italians steadily increased the pressure on British units operating inside Libya. In fact, the British screening forces were operating at the limit of their logistic support and in the worst desert heat of the summer; daytime temperatures could reach up to 43°C (109°F) and water was in very short supply. Consequently, the 11th Hussars could only operate in the early morning hours and evening. Many personnel, such as the audacious Second Lieutenant Gape, became sick after a few weeks in the desert and had to be sent back to Cairo to recuperate. Trying to control a dispersed squadron by radio over a distance of over 160 kilometres also stretched British command and control to its limits. In retrospect, Brigadier Caunter was being far too aggressive with his covering force, exposing it to risk for very limited gain. Reports of small enemy truck convoys simply did not answer any of O'Connor's priority intelligence requirements (PIRs), such as when would the Italian 10ª Armata invade Egypt.

The Italians slowly began inflicting losses on Combe's 11th Hussars, with air attacks, ambushes and mines. Nor could the 11th Hussars prevent the Italians from re-occupying Fort Capuzzo and digging in a battalion of artillery there, supported by 47mm anti-tank guns. When Caunter learned about this development, he ordered Lieutenant Colonel Fielden's 7th Hussars to mount a full-scale attack on Fort Capuzzo to drive the enemy out. The first attack, conducted on the morning of 29 June, was an all-tank affair. Charging to within 1,500 metres, Fielden's three tank squadrons encountered heavy artillery fire and some anti-tank fire, which was unhealthy for the thin-skinned Mk VIb lights and A-9 cruisers. The 2-pdr guns proved completely incapable of hitting dug-in enemy guns, so Fielden pulled back. The Italians called up close air support, which annoyingly bombed and strafed the British armour, which was trying to re-form. Colonel Gairdner turned up and chided Caunter into making another attempt, this time with a battery of four 25-pdrs to support the attack. However, no infantry was committed to the attack. The 25-pdrs arrived, fired ineffectually for 40 minutes, and then stopped by about 1845 hours. Fielden was slow to organize the second attack, which did not commence until 2035 hours. The 7th Hussars mounted a converging attack from three directions in the evening twilight, moving rapidly to within 500 metres of the Italian positions, in the best cavalry tradition. The Italians fired flares and opened fire with every gun. A platoon of CV-35s also joined the action, attempting to ram one British tank. Multiple British tanks were hit and Fielden was wounded (Major Frederick W. Byass took command of the 7th Hussars). Although Italian gunnery was poor, there was a lot of it and the British armour withdrew after two tanks were destroyed and several others damaged.[8]

After this unsuccessful action, Creagh decided to replace Caunter's 4th Armoured Brigade with Brigadier Hugh Russell's 7th Armoured Brigade. Although part of the 11th Hussars was pulled back to rest, C Squadron continued to operate near the Bardia-Tobruk road in the hope of intercepting more Italian convoys. Instead, the Regia Aeronautica spotted two troops of 11th Hussars around noon on 25 July and CR-42 fighters subjected them to intense bombing and strafing attacks. This time, the Italian pilots did not miss and all six armoured cars were knocked out. On top of this, a platoon of M11/39 tanks, just arrived from Benghazi, appeared and dispersed the dismounted British crewmen. Although a minor tactical success, this action demonstrated that the Italians were capable of coordinating tanks and aircraft, as well as conducting a competent counter-reconnaissance action.

While the British continued to contest the area around Fort Capuzzo-Sidi Azeiz well into August, the wear and tear on their vehicles was considerable and they achieved no further successes. On 5 August, Lieutenant Colonel T. G. Watson's 8th Hussars encountered elements of Major Eugenio Campanile's II.Btgl. Carri. M. near Sidi Azeiz, in the first action between British cruiser tanks and the M11/39 tanks. Details on this action are sparse, but it is clear that the Italians destroyed two British tanks (likely Mk VI) and captured two A-9s that had been disabled or thrown track. In exchange, three Italian M11/39 tanks were destroyed.[9] The British tankers opened fire with their 2-pdr guns at around 600–700 metres and could easily defeat the 30mm

ITALIAN BRIGATA CORAZZATA SPECIALE (BCS), DECEMBER 1940–FEBRUARY 1941



Note: the composition of the BCS varied over its three-month existence. Its nominal tank strength was about 150 M-tanks and 1–2 battalions of tankettes, but its actual field strength varied between 70-100 M-tanks.

frontal armour on the M11/39s at that range, when they could hit them. The Italian *carrista* were quick to recognize that their hull-mounted 37mm gun left them at a severe disadvantage against British cruisers with turreted-mounted 2-pdrs, although in terms of mobility and armoured protection the M11/39 was comparable to the A-9.

After this action, Wavell directed O'Connor to reduce the covering force operation in order to conserve the 7th Armoured Division. By mid-August, nearly half the vehicles in 7th Armoured Division were deadlined for repairs and few spares were available.[10] Some British sources claim that the two-month-long covering force action inflicted over 3,000 casualties on the Italian 10ª Armata, which is absurd; Italian sources indicate that they suffered 558 casualties in the first two weeks of the desert campaign, which is when the British inflicted the most damage. Aside from the destruction of one company of CV-35 tankettes and one platoon of M11/39s, no other Italian armour was lost. In contrast, British personnel losses were light, but they lost at least five light tanks, two cruisers and eight armoured cars, plus more damaged. Although Creagh and his brigade commanders were sanguine about the casualties they had inflicted on the Italians, they had actually achieved very little in operational terms, since they lacked the strength to prevent the Italian XXI Corps from reinforcing its border outposts. The British cavalrymen also had a tendency to confuse raiding with reconnaissance, which led to unnecessary losses. As an old Apache saying goes, 'one man sees as much as ten men' – ergo, reconnaissance is best conducted by small, inconspicuous units. Committing an armoured brigade to a two-month-long reconnaissance mission was a contravention of British pre-war doctrine and a mis-use of a precious asset which needed to be conserved for the appropriate moment to strike.

For their part, the Italians learned two lessons from the initial desert skirmishes. First, their tankettes and obsolete field artillery were of no use against British armoured units in an open battle; thus, these kinds of actions should be avoided until better equipment was available. The new M11/39 medium tanks seemed best suited for defence, rather than offence. Second, British armour was stymied by fortified positions, surrounded by mines and protected by multiple field guns; thus, fortified camps seemed to offer a means to neutralize the British advantage in armour. Despite inducing greater caution into Italian tactics, the early desert actions did demonstrate the bravery of Italian *carristi* (tankers), who were willing to attack enemy vehicles that were clearly superior.

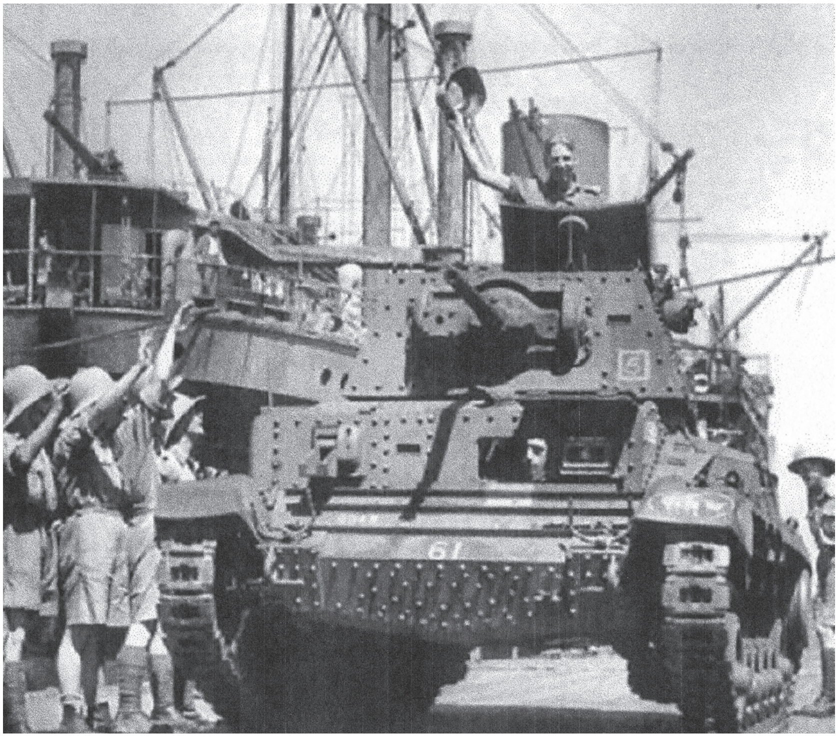
DISASTER IN EGYPT, SEPTEMBER–DECEMBER 1940

Maresciallo Graziano and Generale Gariboldi were not eager to invade Egypt, but Mussolini insisted and the best they could do was put off the inevitable until September 1940. Had Mussolini only intended to invade Egypt, the 10ª Armata might have been provided enough resources to mount a proper operation as the Regio Esercito had done in Ethiopia. However, Mussolini also wanted to invade Greece and committed large resources to a simultaneous build-up in Albania, including the 131ª Divisione Corazzata 'Centauro' and a great deal of motor transport. If Mussolini had deferred his Greek campaign, the Regio Esercito could have deployed a mechanized corps to Libya, albeit a poorly equipped one.

Graziani and Gariboldi used July–August to build up an offensive capability in the 10ª Armata, primarily upon Generale di Corpo d'Armata Annibale Bergonzoli's XXIII Corps (three infantry divisions), Generale Sebastiano Gallina's Libyan group (two Libyan infantry divisions) and the Raggruppamento Maletti (Group Maletti), which had the II Battaglione Carri Medi (M11/39 tanks) and three battalions of truck-mounted Libyan infantry. Gariboldi was provided with a total of about 2,000 motor vehicles, adequate to transport his three Italian infantry divisions, but most of the Libyan infantry would have to walk to the objective, which was Sidi Barrani. Altogether, the strike force for *Operazione E*, the Italian invasion of Egypt, would consist of 30 infantry battalions and four tank battalions (one medium and three light). Much of the Italian armour (five battalions) was kept in reserve near Bardia, along with two more infantry divisions. Despite being reinforced with some medium tanks and additional anti-tank guns, Gariboldi's 10ª Armata was quite unimpressive in terms of mobility and firepower. In order to bolster the anti-tank capability of infantry in North Africa, the Comando Supremo sent the 10ª Armata a batch of newly purchased Swiss-made 20mm Solothurn anti-tank rifles, but it turned out these weapons were only effective against British light and cruiser tanks at ranges under 300 metres.[11] Recognizing the weakness of Italy's quasi-mechanized force, Gariboldi opted to conduct a strategic offensive into Egypt to satisfy Mussolini, but to conduct the operation as a tactical defence once they reached Sidi Barrani. Italian Military Intelligence (SIM) estimated that the British Western Desert Force now had about 700 tanks, which induced great caution. Graziani intended to develop a robust line of communications before plunging deep into Egypt and he was also playing for time, until the arrival of Division 'Ariete' and its new M13/40 medium tanks.

On 13 September 1940, Gariboldi's 10ª Armata began moving into Egypt. Bergonzoli's XXIII Corps and Libyans advanced eastward along the coast, clearing a small British rearguard out of the Halfaya Pass, then Sollum. Although the British laid some mines in the Halfaya Pass and harassed Italian units with long-range artillery fire, O'Connor only had a single reinforced infantry battalion and some artillery batteries defending the coast road, so no effort was made to halt the enemy advance.[12] Generale Pietro Maletti's tank group was deployed as a flank guard and started its advance from Sidi Omar, but quickly got lost in the desert – twice. Combe's 11th Hussars fell back in front of the Italian advance, maintaining contact and reporting the enemy's movements. Gariboldi relied on motorcycle troops to lead his advance and kept his tanks close in hand, which made it impossible to trap or destroy any of the British rearguard units. Amazingly, the Libyan units advanced with camels carrying their light artillery pieces and officers mounted on horseback, as if they were on a colonial expedition.

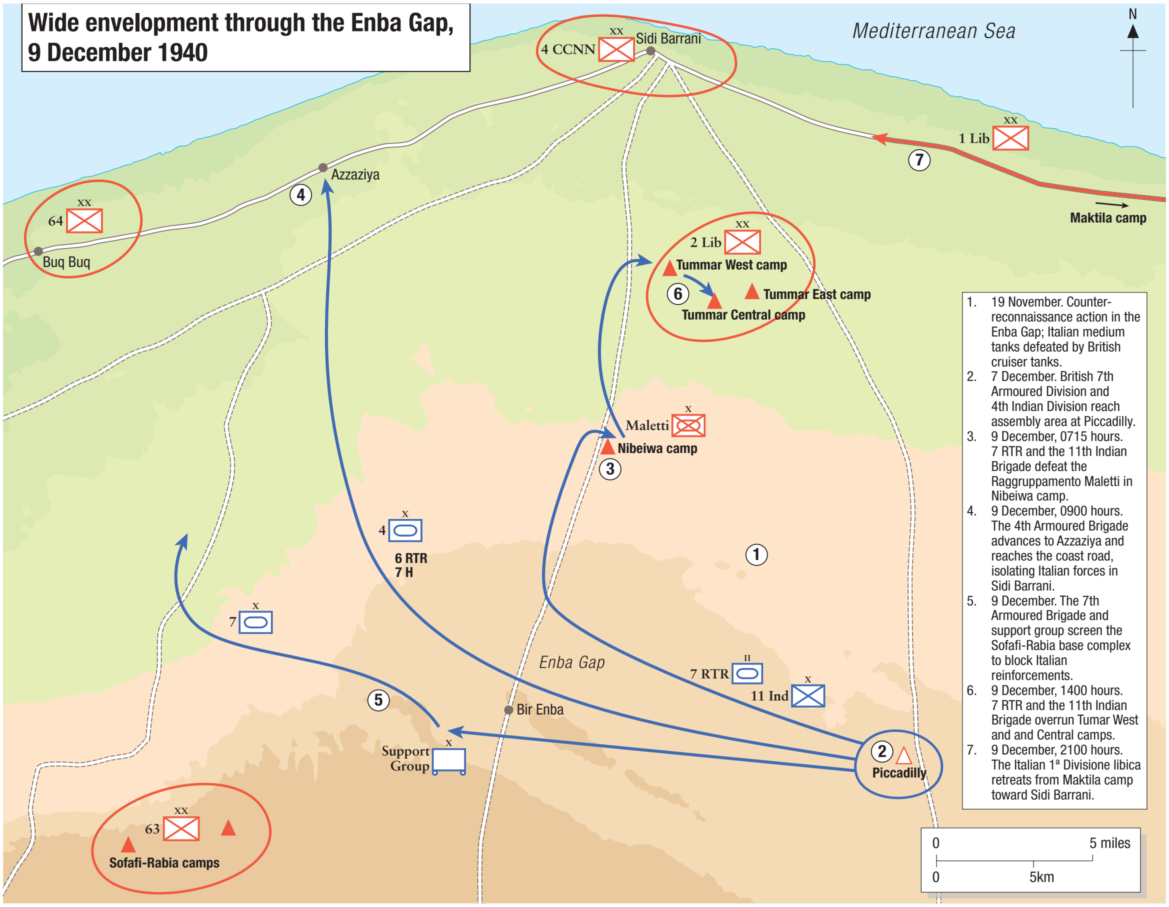
Gariboldi ignored Italian doctrine for mobile warfare and pre-war rhetoric about *guerra lampo* and instead advanced cautiously, almost at a walking pace, with his infantry leading while the tanks followed. The one impressive unit in the invading force was the I Battaglione sahariano (1st Saharan Battalion), which was trained and equipped for desert reconnaissance. In particular, the battalion's four-wheel-drive Fiat SPA37 trucks were optimized for the desert



An A-10 cruiser from 2 RTR dis-embarking at Alexandria on 5 October 1940, as part of Operation *Apology*. The delivery of over 150 tanks from the UK made Operation *Compass* feasible. (Author's Collection) and could mount a variety of weapons, including 20mm autocannon and 47mm anti-tank guns. On the afternoon of 16 September, the lead elements of Bergonzoli's XXIII Corps reached Sidi Barrani and the next day, they reached Maktila, 24 kilometres to the west, and halted.[13] Gariboldi then began deploying his divisions into a linear defensive line, centred on several fortified camps, stretching 26 kilometres to the south. The accompanying M11/39 medium tanks had suffered no combat losses, but 31 out of 68 were not mission capable after moving just 100 kilometres. Gariboldi intended to remain within range of Italian air support, while stockpiling supplies for the next phase of the advance, to Mersah Matruh. No fuel or food awaited the invaders at Sidi Barrani – it all had to be brought up by truck from Bardia and Tobruk. Since the British had poisoned the wells at Sidi Barrani (which British histories studiously avoid mentioning), it would take time to provide a daily water supply for over 60,000 troops. Furthermore, the Via Balbia stopped at the Libyan–Egyptian border and the existing road was insufficient to handle daily traffic from hundreds of trucks, so considerable engineer effort would be required to create a viable line of communications for the 10ª Armata. Consequently, for the next 12 weeks, Gariboldi focused on improving his forward positions and solving his logistical problems, but did not advance another inch further east.

Leaving Combe's 11th Hussars as a screening force to monitor the Italians at Sidi Barrani, O'Connor waited with the bulk of the Western Desert Force 130 kilometres to the east, at Mersah Matruh. A strong defensive position, known as the Baggush Box, was created east of Mersah Matruh – an early example of the British use of fortified boxes in the desert. Creagh's 7th Armoured Division was concentrated near the town and O'Connor hoped that the Italians would advance so that he could launch a concentrated attack with all his armour. However, Creagh only had about 70 operational cruiser tanks, including ten recently arrived A-10 tanks, which was not much of a strike force either. Weeks passed and the enemy made no advance, which prompted O'Connor to begin rethinking his plan to fight an aggressive defence at Mersah Matruh. By the end of September, the first of the *Apology* convoys reached Suez from England, bringing with it 165 tanks from the 3rd Hussars, 2 RTR and 7 RTR, as well as additional 2-pdr anti-tank guns and 25-pdr howitzers. By 4 October, the convoy had been unloaded and crews re-united with vehicles. Lieutenant Colonel Alexander C. Harcourt's 2 RTR had a mix of cruiser tanks, including 18 of the new A-13 Cruiser Mk. III tanks. The real game-changer was Lieutenant Colonel Roy M. Jerram's 7 RTR, equipped with 50 Matilda II infantry tanks, which were nearly invulnerable to all Italian anti-tank weapons. Jerram's Matilda II tanks were moved forward by rail from the Abbassia depot to the Sidi Haneish rail station east of Mersah Matruh on 21 October.[14]

With the additional reinforcements, Creagh was able to substantially upgrade the 7th Armoured Division. Each armoured brigade now had over 150 tanks, one-third of which were cruisers (A-9, A-10, A-13). Jerram's 7 RTR was kept as a corps-level asset, under O'Connor's control. Furthermore, O'Connor received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Wide envelopment through the Enba Gap, 9 December 1940

1. 19 November. Counter-reconnaissance action in the Enba Gap; Italian medium tanks defeated by British cruiser tanks.
2. 7 December. British 7th Armoured Division and 4th Indian Division reach assembly area at Piccadilly.
3. 9 December, 0715 hours. 7 RTR and the 11th Indian Brigade defeat the Raggruppamento Maletti in Nibeiwa camp.
4. 9 December, 0900 hours. The 4th Armoured Brigade advances to Azzaziya and reaches the coast road, isolating Italian forces in Sidi Barrani.
5. 9 December. The 7th Armoured Brigade and support group screen the Sofafi-Rabia base complex to block Italian reinforcements.
6. 9 December, 1400 hours. 7 RTR and the 11th Indian Brigade overrun Tumar West and and Central camps.
7. 9 December, 2100 hours. The Italian 1ª Divisione libica retreats from Maktila camp toward Sidi Barrani.

the 4th Indian Division, which gave him a seasoned infantry unit. By 20 October, Wavell was requesting permission to launch a limited attack against the forward Italian positions. Unfortunately, events outside Wavell's control had a direct impact on his plans to mount a counter-stroke against the Italian 10ª Armata at Sidi Barrani. First, the Italians invaded Greece from Albania, which prompted Churchill to provide assistance to the Greeks, which meant taking troops and air support from Wavell's command. Second, Italian operations in Ethiopia caused Churchill to direct Wavell to send reinforcements, such as the 4th Indian Division, to the Sudan. Strategic distractions and attempts by Churchill to micro-manage operations complicated Wavell's ability to develop and plan a set-piece operation against Gariboldi's forward positions near Sidi Barrani. In the interim, Creagh's 7th Armoured Division continued to develop a strong defensive position at Mersah Matruh, while using the 11th Hussars to mount aggressive patrolling against the Italian positions. A raid against the Italian fortified camp at Maktila on the night of 23/24 October failed and was driven off by strong enemy fire, which probably encouraged Gariboldi to think his forward positions were secure.[15]

Egypt, mid-September 1940. While a column of empty Italian trucks heads back for more supplies, M11/39 medium tanks head toward Siddi Baranni. Nearly half the M11/39s broke down after moving just 100 kilometres, and the poor reliability and limited capabilities of these vehicles likely reinforced Graziani's hesitance about advancing further into Egypt. (Author's Collection)

Mussolini continually pressured Gariboldi and Graziani to resume their advance into Egypt, but they procrastinated, waiting for more reinforcements. The first battalion equipped with the new M13/40 medium tank, the III Battaglione Carri (M) under Tenente Colonnello Carlo Ghioldi, was rushed to Benghazi in early October and unloaded. The M13/40 was a limited improvement over the M11/39 tank since it mounted a 47mm gun in a full-rotating turret, but it had essentially the same modest mobility of its predecessor. Compared to the British cruiser tanks, the M13/40 had better armoured protection than the A-9, A-10 and A-13 models, but it was slower and its lack of a radio put it at a serious disadvantage in mobile warfare. Equipped with just 37 M13/40 tanks, Ghioldi's battalion was kept in reserve near Gambut in Libya and spent the rest of October in training. A second M13/40 battalion, the V Battaglione Carri Medi under Tenente Colonnello Emilio Iezzi, was earmarked for Libya but would not arrive until mid-December. In order to mass both medium tank battalions under a single commander, Graziani directed his armoured force commander, Generale di Brigata Valentin Babini, to form a special armoured brigade (Brigata Corazzata Speciale or BCS) on 25 November. Since the lead elements of the 'Ariete' division were not expected to reach Libya until January, Graziani wanted to form an ad hoc armoured division, based on units that were already in-theatre. Thus, the BCS or Babini Group was supposed to consist of both M13/40 medium tank battalions (3 and 5), three *bersaglieri* battalions, one motorcycle battalion, one artillery regiment, two anti-tank gun companies, one engineering company, and several logistics units; in short, this was the first real Italian effort to build a balanced, combined arms force for mechanized warfare. However, the Italian leadership failed to appreciate that it takes more than equipment to form an effective combat team and the Babini group was composed of sub-units that had never trained or worked together before.

Gariboldi's front near Sidi Barrani was anchored upon fortified camps built at Maktila, Tummar, Nibeiwa and Sofafi-Rabia. The camps were based upon experience from previous colonial wars and the First World War: they were organized for all-around defence and protected by minefields, anti-tank ditches and barbed wire. Each camp was defended by a regimental-size force, consisting of entrenched infantry, field artillery, anti-tank guns and an attached tank battalion. Based upon experience gained in the defence of the similar fortified camp at Sidi Azeiz against British armour, Gariboldi had reason to be confident that the camps would be difficult to overrun. However, the British had been afforded over two months to study the camps and they quickly noticed a 24km-wide gap around Bir Enba in the south between the Nibeiwa and Sofafi-Rabia camps, which was dubbed the Enba Gap. By early November, Wavell and O'Connor were already considering a limited offensive against Gariboldi's forward camps and the Enba Gap offered an opportunity to outflank and defeat the enemy in detail. O'Connor sent Combe's 11th Hussars and Lieutenant Colonel Younghusband's 3rd Hussars into the Enba Gap to gather additional information on Italian dispositions and to lay the groundwork for an offensive.[16] It was at this point that the 7th Armoured Division's Support Group began using so-called 'Jock Columns', mixed reconnaissance/battle groups which typically consisted of some motorized infantry, armoured cars and towed artillery pieces. British histories tend to exaggerate the importance of the Jock Columns, which were not particularly innovative and more reflective of past colonial warfare experience than peer versus peer warfare.

In Nibeiwa, Generale Maletti noted this British reconnaissance activity and tried to mount a co-ordinated air-ground response on the afternoon of 19 November, using 27 M11/39 under Major Victor Ceva from II Battaglione Carri Medi, a company of motorized infantry, a mixed artillery group and a squadron of ground attack aircraft. While the initial Italian strafing attacks inflicted some casualties on the 3rd Hussars, the ground assault at 1330 hours did not go well. Capitano Giuseppe Locatelli led a company of M11/39 tanks in the assault near Alam Abu Hilat, against a squadron of A-10 cruisers. The British cruisers calmly engaged the approaching Italian tanks, inflicting multiple hits. Tenente Leo Todeschini, a tank platoon commander, left his tank in an attempt to tow one of his damaged vehicles, but had his leg shattered by a 2-pdr shell. Locatelli tried to order his company to break off the action, but this proved difficult without a radio and he was forced to dismount and run to individual vehicles to tell them to withdraw. While standing next to one damaged M11/39, Capitano Locatelli was hit in the chest and killed. Nearby, Sergente Umberto

Dianda was the driver of an M11/39 that had been hit four times and his other two crew members were dead. Despite being badly wounded himself, Dianda continued to fire by himself for a time, then drove his damaged tank to an aid station. In the short skirmish, Ceva's battalion had at least five M11/39s immobilized and 11 others damaged.[17] The lack of radios proved to be a severe detriment and prevented Ceva from effectively controlling his battalion. Altogether, the Italians suffered 76 casualties in the brief action, including 13 dead.[18] Afterwards, the Regio Esercito was generous in its awards for the skirmish at Alam Abu Hilat, awarding the gold medal for military valor (Medaglia d'oro al valor militare or MOVM) to Locatelli, Todeschini and Dianda. Following this brief action, Maletti pulled his forces back from the Enba Gap and Gariboldi decided to rely upon airpower to keep the British armoured units in check, rather than expose his own limited armour resources to further losses. The Italian failure to mine the Enba Gap or position anti-tank units to keep the Jock Columns out of this mobility corridor was a critical operational-level error.

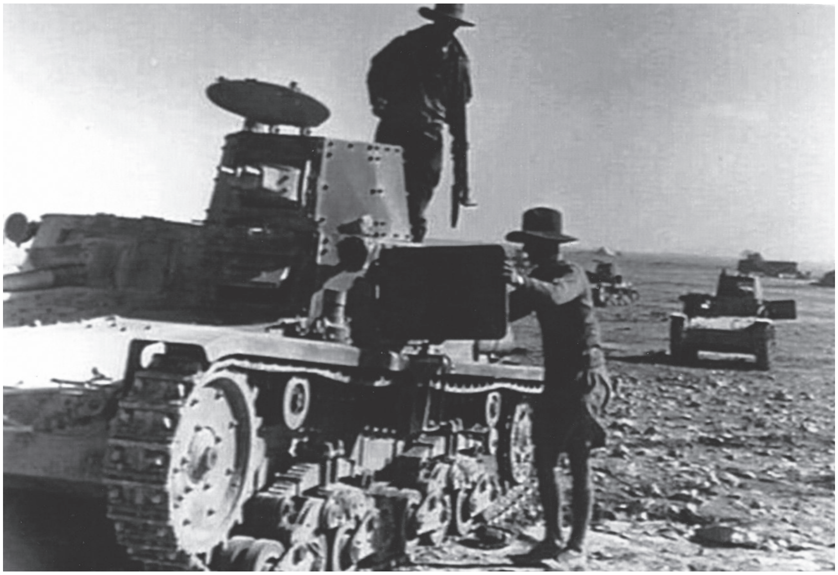
Meanwhile, O'Connor sorted through the available information and developed a rudimentary plan to strike the vulnerable south end of the Italian line of camps, then roll them up. Originally O'Connor wanted to attack the four camps situated around Sofafi-Rabia, but this objective would require longer approach marches over rocky, unsuitable terrain. Instead, O'Connor and his staff selected the Nibeiwa camp as their first target, to be followed up with an immediate attack on the Tummar camps. Although the camps had strong obstacle belts on their eastern and southern faces, British aerial reconnaissance observed gaps in the minefields on their north-western sides. Authorized by Wavell to conduct a 'five day raid' against the Italian forward positions, O'Connor, Creagh and Dorman-Smith developed an aggressive

Major Henry Rew's A Squadron, 7 RTR leads the attack against Nibeiwa camp, on the morning of 9 December 1940. Rew decided to fight unbuttoned in order to enhance situational awareness, but he was killed by enemy fire. (Author's Collection)

A Matilda II tank from 7 RTR advancing out of the smoke and haze during the battle of the camps on 9 December 1940. Although much emphasis was placed on the superior armoured protection of the Matilda tank, the British victory was really due to a combination of aggressive leadership and sound tactics. (Author's Collection)

plan to exploit the Enba Gap with armour, then assault the southernmost Italian camps from their western sides. Wavell approved the plan, which became Operation *Compass*. Unlike the previous British armoured attacks at Arras and Abbeville six months earlier, O'Connor had several weeks to plan the operation and even conduct a full-scale rehearsal on 26 November. At dusk on 7 December, the 7th Armoured Division and the 4th Indian Division began moving forward toward the Enba Gap.

Graziani only committed a small portion of his available medium tanks to support the invasion of Egypt, preferring to leave most in reserve in Libya. (Author's Collection)



Allied troops examine the Italian M11/39 tanks abandoned by the Maletti Group at Nibeiwa camp. The tanks do not appear to be damaged and the crews were caught by surprise. (Author's Collection)

Moving a large armoured force with roughly 5,000 vehicles over 100 kilometres along desert tracks at night from Mersah Matruh to the Enba Gap proved challenging for the limited logistic capabilities of O'Connor's Western Desert Force (WDF). The 7th Armoured Division marched in brigade columns, at a speed of 12 kilometres per hour; the 4th Armoured Brigade column alone was 6 kilometres in length and raised a tremendous amount of dust.[19] Although the Matilda Mk II infantry tanks were a key element of the assault plan, they were poorly suited to long distance movement across desert on their own tracks, possessing a maximum range of barely 70 kilometres. Consequently, the RASC was obliged to set up two Field Supply Depots (FSD) to provide refuelling along the route of march. Jerram's Matildas managed to make the trek in two nights to the assembly point known as 'Piccadilly', located east of the Enba Gap. A few tanks fell out due to mechanical defects, but the B-echelon personnel were on hand to make repairs. Masking the movement from Italian aerial reconnaissance also required limiting most large-scale vehicle movement to hours of darkness, even though night navigation in the desert was problematic. One Italian aircraft did spot the British columns around mid-day on 8 December, about 50 kilometres south-east of Nibeiwa camp, but the report was ignored.[20] The Royal Air Force assisted O'Connor's advance by conducting strikes on Italian air bases, which prevented the Regia Aeronautica from bombing his columns. By 0100 hours, the main strike force – Jerram's 7 RTR and the 11th Infantry Brigade (4th Infantry Division) – were through the Enba Gap and reached an attack position 10 kilometres south-west of Nibeiwa camp.

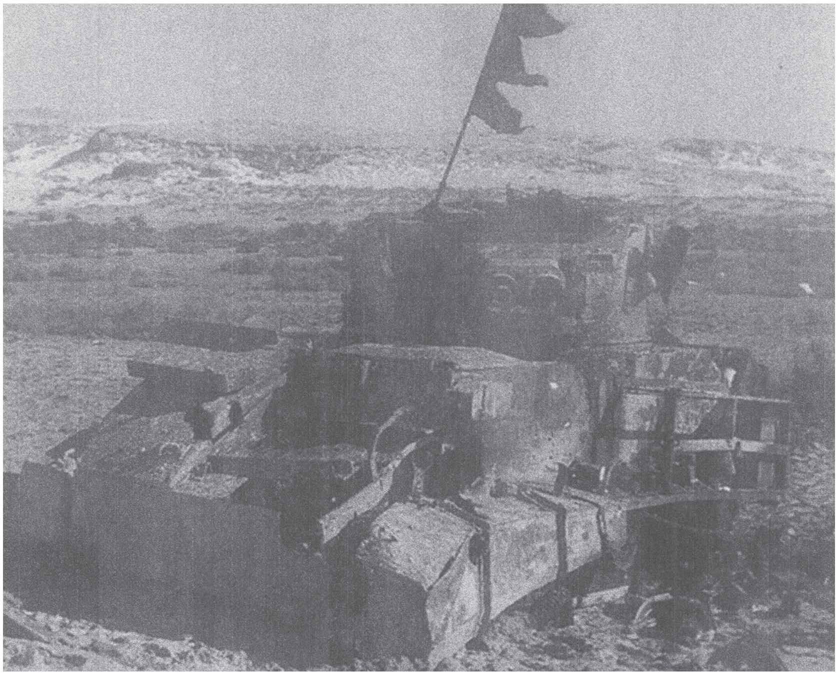
O'Connor's attack on the Nibeiwa and Tummar camps turned out to be exactly the kind of battle that British pre-war armoured doctrine expected. While the cruiser and light tanks from the 7th Armoured Division manoeuvred to cut across the enemy's lines of communications, the 7 RTR's infantry tanks

The 75/27 modello 06 field gun was the backbone of the Italian field artillery in 1940–41, with nearly 500 pieces in North Africa. Although not optimized for the anti-tank role, the 75/27 gun could defeat British light and cruiser tanks under ideal circumstances. (Author's Collection)

would mount a powerful attack against a fixed enemy defence, supported by infantry and artillery. Caunter's 7th Armoured Division was not actually assigned to conduct any fighting on the first day of Operation *Compass*; rather, the 4th Armoured Brigade would thrust north to the sea to cut the coastal road, while the 7th Armoured Brigade merely screened the Italian forces in the Sofafi-Rabia camps.

Although the Italian camps were on alert, a certain amount of laxness was evident at dawn. British diversionary fire throughout the night had kept the defenders awake most of the night and dawn is a time when troops look forward to a respite. The 22 remaining M11/39 tanks from II Battaglione Carri Medi were parked outside the north-west corner of the Nibeiwa camp, with most of the crews eating breakfast away from their vehicles. Tankers tend to be comfort-oriented and this can lead to making tactically imprudent decisions. Although the Raggruppamento Maletti had plenty of motorcycle troops and Saharan scouts, none were deployed to provide advance warning of the British movements. Inside Nibeiwa, Maletti had two battalions of Libyan infantry, the I Battaglione sahariano and plenty of fire support (including four 105mm howitzers, 12 75mm guns, 12 65mm guns, 14 47mm anti-tank guns and 11 20mm anti-aircraft guns).[21] All the infantry were protected by trenches, bunkers and a stone wall (*sangar*). Unnoticed, Jerram's 7 RTR began approaching Nibeiwa camp at 0615 hours and was soon assembled about 1,500 metres from the north-west corner.

Jerram's 7 RTR was thoroughly versed in the existing doctrine of tank-infantry tactics espoused by MTP No. 22 (published in September



On 11 December 1940, A Squadron from the 3rd Hussars charged steady Italian artillery, got stuck in a salt marsh and lost all 13 Mk VIb light tanks. (Author's Collection)

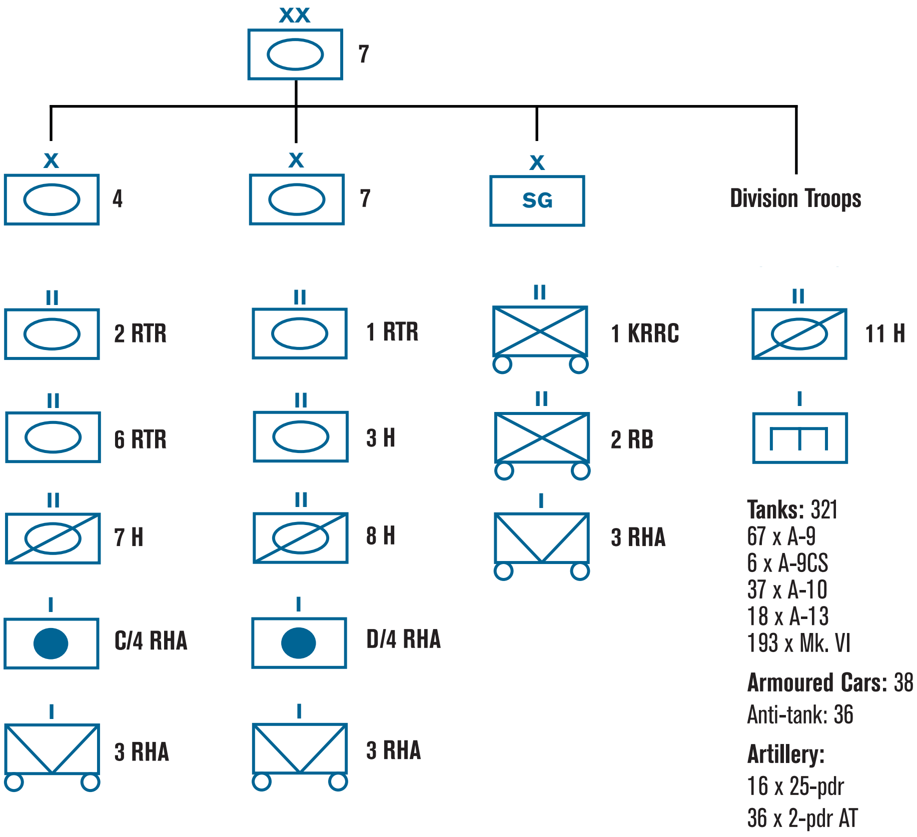
1939), which stipulated that tanks should attack an objective in two echelons. The first echelon, consisting only of tanks, would advance upon the objective after an artillery barrage and suppress enemy weapons with direct fire. The second echelon, consisting of tanks and dismounted infantry, would follow at a distance of about 1,000 metres (or 10–20 minutes later).[22]

Meanwhile, the 4th Indian Division deployed most of its artillery east of Nibeiwa and started a 10-minute artillery preparation on the camp at 0715 hours. This barrage was the first time that the Italians experienced a large-scale British artillery barrage (fired by 56 24-pdr guns, eight 127mm guns and eight 6-inch howitzers), although early morning haze made observation difficult. Satisfied that the defence was suppressed by the barrage, Jerram's 7 RTR started its advance at 0725 hours. The 7 RTR attacked with Major Henry Rew's A Squadron in the first echelon, followed by the regimental headquarters element, then Major Edward Hawthorn's B Squadron in the second echelon, followed by two platoons of British infantry in carriers (a total of about 60 infantrymen). Jerram kept Major Kenneth P. Harris' D Squadron in reserve, so only 32 Matilda tanks actually attacked the camp.[23] One battery of 24-pdrs fired in direct lay to suppress the defences on the north-west corner of the camp. Advancing on line at a speed of about 150 metres per minute, Rew's Matildas quickly knocked out the cluster of M11/39 tanks outside the camp, shooting up some with 2-pdr AP (Armour Piercing) rounds and machine-gunning crews who were frantically running to their vehicles. Perhaps suppressed by the British barrage, the Italian artillery did not open fire until Rew's tanks were within about 700 metres of the perimeter and their accuracy was poor. One Matilda tank driver, whose hatch was open, was seriously wounded, but otherwise the British armour reached the entrance to the camp virtually unscathed. Around 0735 hours, Rew aggressively pushed into the camp with six Matildas, engaging the Italian artillery at point-blank range with 7.92mm coaxial fire (Besa). Although the Italian 47mm anti-tank gun could not penetrate the 78mm thick frontal armour on the Matilda, it could penetrate the thinner side armour at ranges under 200 metres. While some British accounts suggest that Italian fire was ineffective against the Matildas, in fact most of the tanks that entered Nibeiwa suffered significant external damage from multiple hits. Some Libyan infantry attempted futile close assaults with hand grenades, which failed miserably. Soon tanks from Hawthorn's B Squadron also entered the camp, while two battalions of infantry dismounted from trucks and began advancing on foot toward the camp. Major Rew, still exposed in his turret, was killed by enemy fire, but his Matildas gunned down Generale Maletti when he emerged from his bunker. Once British infantry entered the camp, Italian resistance began collapsing around 0830, but sporadic resistance continued for another two hours.

Jerram's 7 RTR, with support from the artillery and 11th Indian Brigade, had demolished Raggruppamento Maletti in three hours of intense fighting. Several Matildas had been hit by artillery rounds, with at least two disabled by direct hits on their radiators. Total Commonwealth losses were two killed and five wounded from 7 RTR and 49 casualties in the infantry units. In contrast, the Italians suffered at least 490 and possibly as high as 800 dead and 2,700 captured (many British sources claim 4,000 prisoners at Nibeiwa), plus all their equipment was lost.[24] Jerram hurried to re-assemble his regiment in order to attack the Tummar camps as soon as possible, but seven tanks from A Squadron stumbled into one of the minefields around the camp and were disabled – ample proof that the Italian B2 anti-tank mine could have stopped the Matildas from entering Nibeiwa. Given O'Connor's negligible engineer assets (just one company in the 7th Armoured Division), if the Italians had emplaced more extensive minefields and covered them with fire, the British assault plan would likely have faltered.

Despite the losses to mines, Jerram displayed considerable leadership ability in consolidating on the objective, quickly re-arming and re-fuelling. Captain George G. Anderson, the battalion technical officer, led a close support team at Nibeiwa that began repairing battle-damaged tanks while fighting was still on-going. After this brief recovery, Jerram then dispatched Harris' D Squadron and nine other Matildas to attack the Tummar West camp, located about 12 kilometres to the north. Jerram led from the front in a staff car, but a sudden sandstorm made it difficult to find the camp. Eventually, Jerram stumbled upon the camp and ordered D Squadron into the attack at 1350 hours. Tummar West was defended by three Libyan infantry battalions and ample artillery, and this time the defenders were not caught by surprise. Nevertheless, after a brief artillery preparation, D Squadron exploited gaps in the mine belt on the north-west corner of the

7TH ARMOURED DIVISION, DECEMBER 1940



Tanks: 321
67 x A-9
6 x A-9CS
37 x A-10
18 x A-13
193 x Mk. VI

Armoured Cars: 38
Anti-tank: 36

Artillery:
16 x 25-pdr
36 x 2-pdr AT

camp, while infantry from the 5th Infantry Brigade dis-embarked outside the camp. Once again, the Italian gunners fired furiously at the Matildas and Major Harris was temporarily blinded by a direct hit on his turret. The British repeated their methodical tactics of eliminating one gun after another, while their infantry moved into the camp. By 1600 hours, resistance in Tummar West was broken. During the action, the Italian garrison in Tummar East tried to send a battalion-size force, with 22 tankettes from the 9 Btg. Carri L., to aid their fellows, but it was repulsed with heavy losses by the supporting British infantry.[25]

No doubt exhausted, Jerram still had the wherewithal to rally nine tanks and send them against the Tummar East camp, 8 kilometres to the east, with a small amount of infantry support. However, the growing darkness and continuing sandstorms made navigation difficult and the assault group became disoriented. Six Matildas attacked Tummar East, but were without infantry support so the attack was suspended. Nevertheless, the demoralized garrison would surrender the next morning, including the rest of the 9 Btgl. Carri L. The other three Matildas overran a small sub-camp known as Tummar Central.

Over the course of less than ten hours, the assault group had smashed seven Italian battalions and inflicted over 6,000 casualties on the enemy. However, only ten of Jerram's 47 Matildas were still operational by the end of the day.

While the 7 RTR and 4th Indian Division were eliminating the centre of the Italian frontline, Colonel Horace L. Birks led the 4th Armoured Brigade north-west toward the coast. The armoured cars of Combe's 11th Hussars were the first to reach the coast, west of Sidi Barrani, around 0900 hours. A squadron from 6 RTR soon arrived, followed by the 7th Hussars.[26] Birks expected the Italians to have an armoured reserve around the village of Azzaziya, but in fact the two tankette battalions were further to the west at Buq Buq. Gariboldi recognized that the British attack had broken his centre and isolated the two divisions near Sidi Barrani, but there was little he could do to stop O'Connor's offensive. The only real mobile reserve – Babini's armoured brigade – was 145 kilometres to the west and not yet ready to meet British tanks in battle. His remaining armour – four battalions of tankettes – could not even stand up to the British cruiser tanks. Nor was the Regia Aeronautica in a position to help much, since RAF raids had destroyed 39 aircraft on the ground just prior to Operation *Compass*. The only sensible course of action was a tactical withdrawal to save as much of the 10ª Armata as possible. The 1ª Divisione libica was the first to retire, abandoning the Maktila camp by 2100 hours on 9 December and pulling back toward Sidi Barrani.

However, before Gariboldi could order a full-scale withdrawal, the British launched an assault upon Sidi Barrani on the morning of 10 December. Jerram personally led a composite squadron with his ten operational Matildas to support the attack and 7 RTR destroyed seven batteries of artillery. Nevertheless, the Italian division-size garrison fought hard and Second Lieutenant Hugh F. Fane-Hervey's Matilda tank was disabled and he and his crew were briefly captured. Birks' 4th Armoured Brigade also committed parts of 2 RTR and 6 RTR to the fighting around Sidi Barrani, which proved costly. Major John P. Brown, commander of C Squadron 2 RTR, was killed when his A-10 was destroyed by Italian artillery fire.[27] Despite inflicting some losses on the British armour, the Italian forces in Sidi Barrani finally surrendered at 1640 hours. The 1ª Divisione libica, east of Sidi Barrani, also managed to knock out a number of 6 RTR's thin-skinned tanks and held out until midnight. Despite major success at Sidi Barrani, the British pursuit was not entirely successful. Brigadier Russell's 7th Armoured Brigade failed in its mission to screen the Sofafi-Rabia camps, which allowed the 63ª Divisione 'Cirene' to escape intact during the night of 10/11 December. The 64ª Divisione 'Catanzaro' evacuated Buq Buq and slowly began retreating toward Sollum, along the coast road.

Caunter ordered Russell's 7th Armoured Brigade, along with Combe's indefatigable 11th Hussars, to lead the pursuit of the retreating Italian forces, since this was the only British armoured force that was still fully capable. Although Russell's brigade had seen little action in the first three days of Operation *Compass*, mechanical defects were rapidly reducing its operational strength; for example, the 8th Hussars only had 25 of its 50 tanks still running.

On the morning of 11 December, Lieutenant Colonel Younghusband's 3rd Hussars ran into the rearguard of the 64ª Divisione 'Catanzaro' west of Buq Buq. The bulk of the Italian divisional artillery was deployed on line, facing both east and south. Since hundreds of Italians had already been captured fleeing from Buq Buq, the enemy appeared to be in full retreat. While B Squadron (cruisers) tried to outflank the enemy around their southern flank, the light tanks of A and C squadrons moved straight forward along the coast road. A Squadron advanced at a gallop, but unexpectedly ran into a salt marsh, which bogged down all their vehicles. At a range of about 500 metres, the Italian artillerymen methodically bombarded the immobilized British squadron, destroying 13 Mk VI light tanks, resulting in ten dead and 19 wounded. Some of B Squadron's light tanks, following behind A Squadron, also became bogged in the salt marsh. The situation looked grim for the 3rd Hussars, but one cruiser tank from B Squadron and four armoured cars were able to cross the salt marsh on a narrow track and engage the Italian gun line with machine-gun fire. Not realizing how small the British force was, the Italian artillerymen panicked, which led to the rapid surrender of about 1,800 troops and the loss of all the divisional artillery. The rest of the 'Catanzaro' division, including two battalions of tankettes (XX, LXIII) fell back toward Sollum and formed another rearguard position at Bir Tishdida. Russell's 7th Armoured Brigade secured the Halfaya Pass, then attacked the Italians at Bir Tishdida on 13–14 December. Since the British had no Matilda II tanks here and the Italians were dug in on a narrow sector between the coast and the escarpment, Russell was obliged to fight a more methodical battle with his thin-skinned cruiser and light tanks. The Italian rearguard, including both tankette battalions, was eventually demolished, but it bought time for the rest of the 10ª Armata to reach Bardia.

Operation *Compass* proved to be a major success and appeared to validate British armoured warfare doctrine. O'Connor initially claimed to have taken over 38,000 prisoners and eliminated three Italian divisions (1st and 2nd Libyan, 4 Camicie Nere (CC.NN)) in the opening round, while routing the remainder of the 10ª Armata. In fact, the entire strength of the three destroyed divisions and the Maletti Group was less than 25,000 personnel and a number of personnel likely escaped through the 7th Armoured Division's loose ring during the night of 10/11 December.[28] In any event, the 10ª Armata was in retreat and, with this success, Wavell now authorized O'Connor to extend the operation into Libya in order to pursue the defeated enemy. However, O'Connor's ability to continue his offensive into Libya was problematic because the 4th Indian Division was withdrawn and sent to the Sudan (it was replaced by the 6th Australian Division) and British theatre logistics were strained nearly to breaking point. The British wonder weapon – the Matilda Mk II – was nearly spent, with barely one squadron still operational. Even the A-9 and A-10 cruiser tanks were proving to be mechanically unreliable in the desert, which gradually sapped 7th Armoured Division's combat power. The easy success against the Italians in the early days of Operation *Compass*

The Italian 47mm 47/32 anti-tank gun was a good weapon by the standards of 1940, although it was also largely ineffective against the British thick-skinned infantry tanks. Nevertheless, the 47/32 gun remained in use throughout the North African campaign. (Author's Collection)

caused many British commanders and troops to adopt an insouciant attitude toward desert warfare, particularly in regard to operating in dispersed formations, which would lead to disaster against the Deutsche Afrika Korps.

THE ROAD TO BEDA FOMM, DECEMBER 1940–FEBRUARY 1941

'Fox killed in the open.'

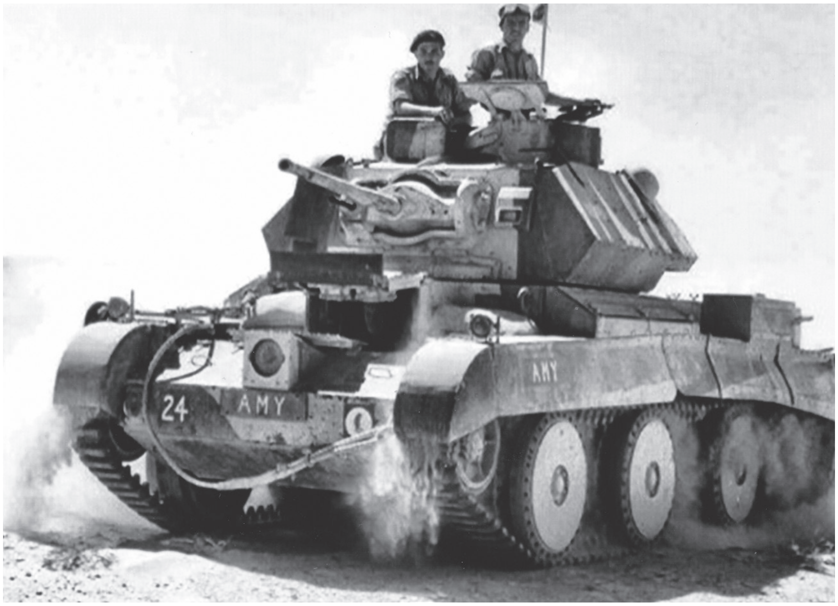
Lieutenant General Richard O'Connor, 7 February 1941

Six days after the start of Operation *Compass*, the Western Desert Force had occupied Halfaya Pass and Sollum. Patrols from the 11th Hussars were already across the wire into Libya, although logistic problems made it difficult for O'Connor to push combat power forward to the border.[29] Evacuating the mass of Italian prisoners and transferring the 4th Indian Division tied up most of the WDF transport resources. Indeed, Creagh (who had returned to command 7th Armoured Division) could only move his armoured brigades across the border by taking all the motor transport from his support group to ferry fuel and ammunition forward. Consequently, O'Connor's advance into Egypt started as a tank-heavy affair with little artillery or infantry support and sustained only by shoe-string logistics.[30]

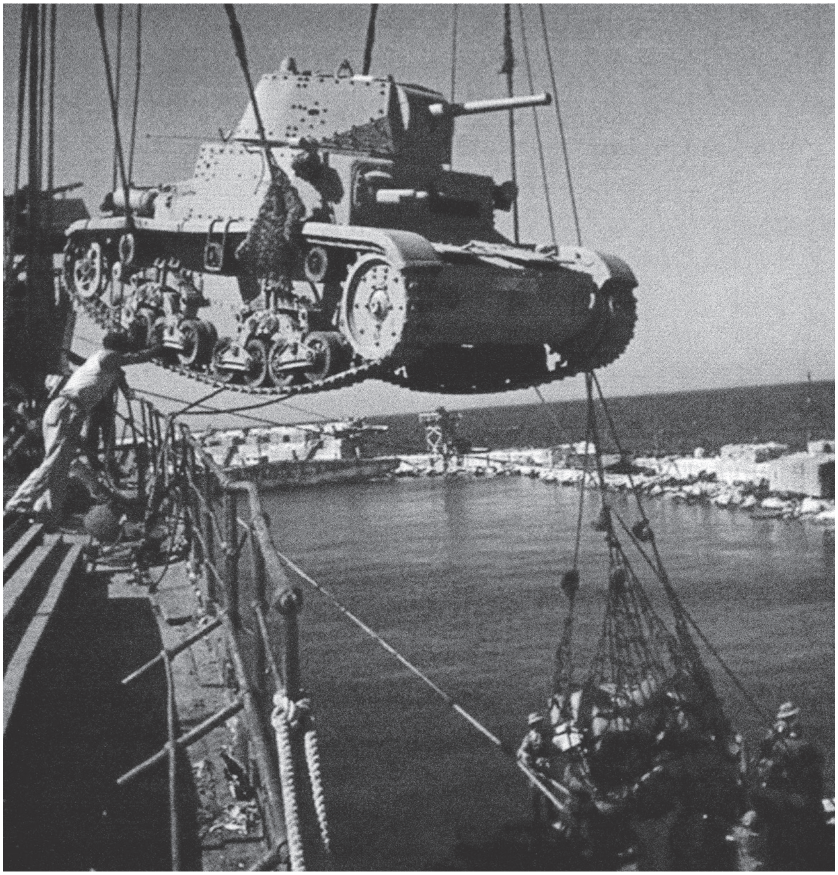
Given a brief respite until O'Connor could push across the border in strength, Generale Bergonzoli was able to rally a corps-size force with four divisions at Bardia (62, 63, 1 and 2 CC.NN), plus remnants of some other units. Although the RAF airfield interdiction campaign was gradually wearing down the Regia Aeronautica in Libya, Italian ground attack units were still able to mount some effective sorties against the British armour, which was operating beyond the range of friendly fighter cover; 11th Hussars had four armoured cars knocked out by strafing CR. 42 fighters on 14 December and was continuously harassed from the air. However, Bergonzoli's main hope was to get Babini's Brigata Corazzata Speciale into action. The second medium tank battalion equipped with M13/40 tanks, Tenente Colonnello Emilio Iezzi's V Btgl. Carri M., had joined Babini's command on 12 December.[31] With this reinforcement, Babini now had a credible armoured brigade, with 74 M13/40 and 40 M11/39 medium tanks, plus two battalions of tankettes. On 19 December, the Comando Supremo ordered all medium tanks sent to Libya.

The disaster in Egypt sent shock waves through the Italian command structure and Gariboldi was replaced as commander of the 10ª Armata by Generale di Corpo d'Armata Giuseppe Tellera, who was a competent professional infantry officer. Nevertheless, Graziani, as theatre commander, decided to keep Tellera on a short leash and play it safe. Rather than using Babini's armoured brigade as a mobile reserve to strike at the 7th Armoured Division if an opportunity arose, Graziani reverted to pre-war doctrine and opted to keep most of the armour tied to the infantry support role. When Bergonzoli requested some of the new medium tanks to reinforce his defence of Bardia, Babini was ordered to detach one company of M13/40s (1ª Compagnia under Tenente Elio Castellano) from the III Btgl. Carri M. to join the garrison. Graziani ordered the rest of Babini's brigade pulled back toward Tobruk, since he was worried that the British armour might bypass Bardia and head straight for this key port city.

If Graziani and Bergonzoli had been better informed about O'Connor's problems, they might have been more willing to employ Babini's brigade more aggressively. In addition to his persistent logistic problems, O'Connor was unable to move the 6th Australian Division forward to the border until 21 December. Artillery, engineer and air support was also limited. Here the flawed organization of the 1940 British armoured division, which had only a single regiment of artillery, was exposed. Furthermore, the poor operational readiness of the British armour was of great concern; by late December, 7th Armoured Division only had 150 of its original 350 tanks operational and 7 RTR had just 25 of its 47 Matilda IIs in running order. Although combat losses were few, the ability of the pre-war-designed British tanks to move long distances in the desert was proving to be a great disappointment and the Royal Army Ordnance Corps (RAOC) had very limited ability to repair vehicles under field conditions. The fragile track pins on the A-9 and A-10 cruiser tanks were the primary culprit, since they tended to break frequently when moving over rocky surfaces. Faced with these constraints, O'Connor was forced to mount a 'rock soup' style offensive into Egypt, reduced to using captured Italian trucks to haul part of his supplies. The reduction of Bardia, then Tobruk, was primarily a task for the 6th Australian Division, while armour was to be used sparingly. O'Connor recognized that 7th Armoured Division was his operational centre of gravity and if squandered, the offensive would culminate short of its objectives, so it was assigned screening missions. On 1 January 1941, the Western Desert Force was re-designated as the XIII Corps, which still consisted of just two divisions. In contrast, Bergonzoli had four divisions inside Fortress Bardia, protected behind an anti-tank ditch and with plenty of artillery and bunkers. Bergonzoli also had one company of 13 M13/40 tanks and three battalions of tankettes (XX, LXI, LXIII).[32] This time, there was no vulnerable flank to exploit and the enemy was expecting an attack. The 6th Australian Division planned a classic set-piece assault, which commenced at 0640 hours on 3 January with a 25-minute artillery preparation. While the Italians endured the barrage, Australian sappers quickly breached the obstacle belt and created six crossings over the anti-tank ditch for Jerram's 7 RTR. By 0730 hours, two platoons of Matildas were through the breach, despite heavy Italian defensive fire.[33] The Australian infantry and Matildas worked well together, even though the Australians had no prior experience with tanks. Once the Italian perimeter defence was punctured, the infantry-tank teams quickly began rolling up one position after another. In response, Bergonzoli committed Castellano's medium tank company – without infantry support – to try and stop the Allied advance toward the town. Around noon, six M13/40 tanks advanced up the Wadi el Ghereidia in single file, toward one of the Australian infantry battalions. The Australians promptly deployed an anti-tank platoon equipped with three 2-pdr guns mounted portee (on trucks) and ambushed the Italian tanks, destroying all six for the loss of one portee.[34]



A Mk IVA cruiser tank, 'Amy', from 1 RTR during Operation *Compass*. The MK IVA (A-13) has significantly less range than the A-9 or A-10, but was a more mature design. Note the tow cable is combat rigged. (Author's Collection)



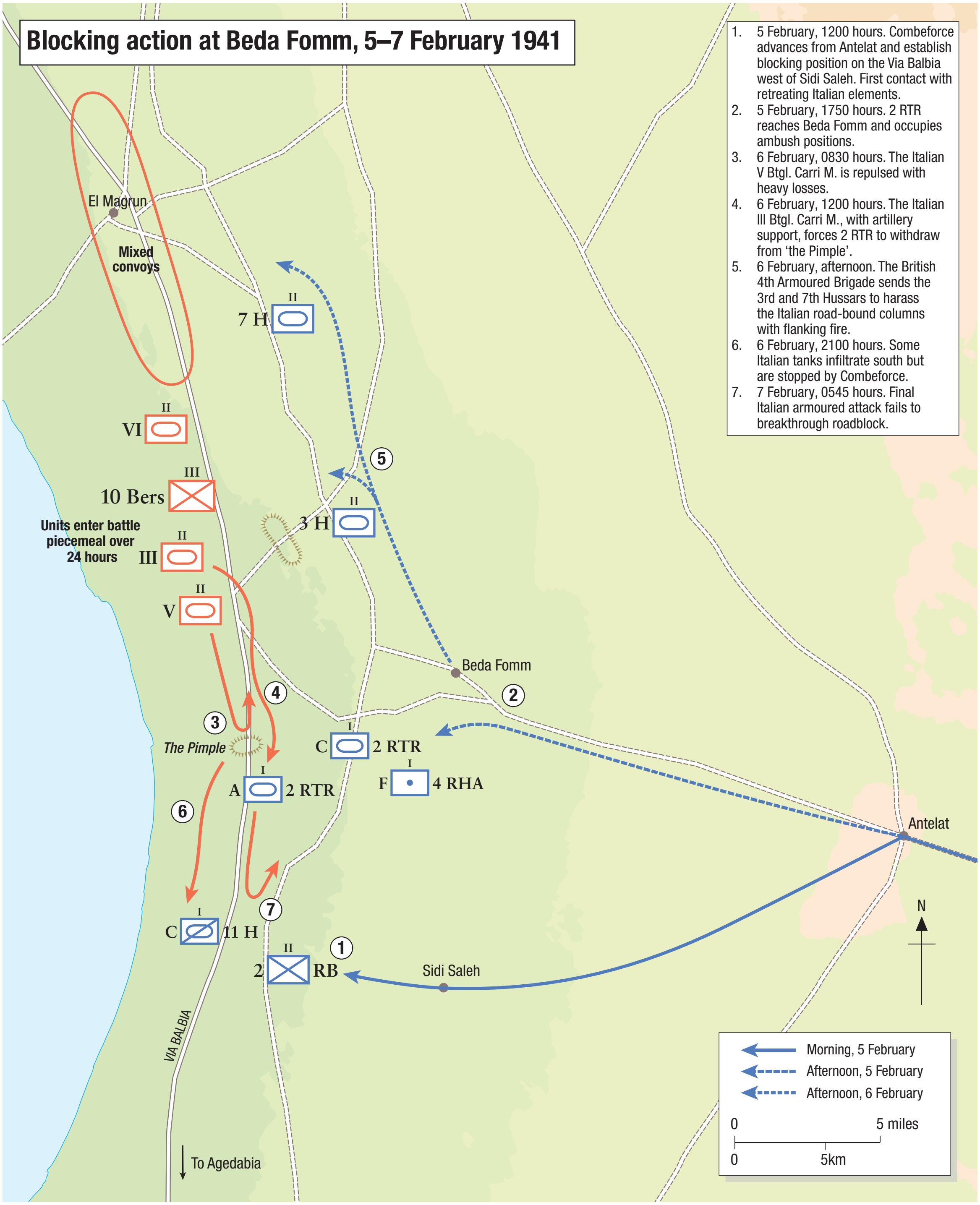
The first Italian tank battalion equipped with M13/40 medium tanks arrived at Benghazi in October 1940, but the unit was kept in reserve in Libya. The M13/40 did not see action until Bardia in January 1941. (Author's Collection)

Afterwards, Bergonzoli held his remaining armour back. Part of the 6 RTR was also committed to the attack on Bardia, but was pulled back after three Mk VI light tanks were destroyed by enemy artillery. The garrison in Bardia finally surrendered on 5 January. Only three of Jerram's Matildas were still running by the end of the battle (a number had been disabled by mines, but engine failures were increasingly common), but four more Italian divisions had been eliminated and 40,000 prisoners taken. Nevertheless, Bergonzoli and about 7,000 of his troops managed to escape and reach Tobruk. Twelve M13/40 tanks were captured intact in Bardia, as well as 115 near-useless CV-33/35 tankettes. The Australians used the captured Italian medium tanks to upgrade their divisional cavalry squadron, the 6th Cavalry Regiment.

The capture of the port in Bardia and another 700 Italian trucks enabled O'Connor to advance further west toward Tobruk. When the British approached the city, Babini was ordered to detach the I. Btgl. Carri M. to support the garrison, while the rest of his brigade retreated to Mechili. By 10 January, Tobruk was invested by the Australian 6th Division, who spent the next week conducting nightly reconnaissance patrols to identify the enemy defences. O'Connor had no wish to expose the thin-skinned tanks of

7th Armoured Division (69 cruiser and 126 light on 16 January) to Italian artillery fire, so he assigned Creagh a screening mission on the western side of Tobruk's perimeter. O'Connor chose to attack the south-east corner of the Tobruk perimeter, even though the western side of the perimeter was less well fortified. The preparations for the breach of the Italian anti-tank ditch, which was protected by anti-personnel mines, were meticulous and a model of combined arms efficiency, with infantry, tanks, artillery and engineers synchronized for maximum effect. The attack on Tobruk began on the morning of 21 January, with sappers quickly breaching the obstacle belt while British artillery suppressed a portion of the enemy defenders. Once the anti-tank ditch was breached, the 7 RTR's last 16 Matildas crossed and began to wreak havoc upon the enemy defensive positions.[35] Although Italian artillery fire immobilized one Matilda by hitting its tracks, the enemy was unable to stop the British infantry tanks. The Australian 6th Cavalry Regiment also participated in the attack, with its M13/40s adorned by kangaroo insignia. Inside the perimeter, the Italians had entrenched most of their M11/39 tanks, many of which were immobilized due to mechanical issues. Only ten M11/39 tanks were still mobile and they were unable to achieve anything useful. Instead, many of the best pre-war *carristi*, regulars like Sergente Maggiore Pietro Mittica, would go into the bag and sit out the war in British POW camps. Resistance collapsed more quickly in Tobruk and the port was secured by noon on 22 January. The remaining operational M11/39s were added to the Australian 6th Cavalry Regiment. However, Tobruk was the end of the line for Jerram's 7 RTR and both the regiment and the remaining Matildas were sent back to Alexandria to refit.

The capture of Tobruk's harbour improved O'Connor's logistic situation somewhat, at least in terms of fuel and potable water. Wavell authorized him to press on toward Benghazi, but O'Connor was already thinking about using 7th Armoured Division to conduct an end-run across the desert to cut off the Italian line of retreat; this was the kind of decisive stroke that had been envisioned for armour when training the experimental mechanized brigade back in the early 1930s. However, less than half of Creagh's tanks in 7th Armoured Division were still operational, even though the division had not taken heavy combat losses. Lack of spare parts forced cannibalization of non-operational tanks, which became a vicious cycle. Even before the fall of Tobruk, Creagh had sent the 6 RTR and 8th Hussars back to Cairo to refit, leaving his division with just four armoured regiments. Caunter's 4th Armoured Brigade (now 2 RTR, 3H, 7H) was provided most of the remaining tanks, with a total of 31 cruisers and 57 light tanks. Creagh was not sanguine about moving his division 300 kilometres across open desert, which would be a logistic nightmare, but O'Connor, an infantryman, gave his concerns about supply short shrift. O'Connor's new plan was to push the 6th Australian Division along the coast road, through the Jebel Akhdar ('Green Mountains'), to Derna, then Benghazi. Simultaneously, the 7th Armoured Division would split up, with 7th Armoured Brigade supporting the Australian advance while



Blocking action at Beda Fomm, 5–7 February 1941

1. 5 February, 1200 hours. Combeforce advances from Antelat and establish blocking position on the Via Balbia west of Sidi Saleh. First contact with retreating Italian elements.
2. 5 February, 1750 hours. 2 RTR reaches Beda Fomm and occupies ambush positions.
3. 6 February, 0830 hours. The Italian V Btgl. Carri M. is repulsed with heavy losses.
4. 6 February, 1200 hours. The Italian III Btgl. Carri M., with artillery support, forces 2 RTR to withdraw from 'the Pimple'.
5. 6 February, afternoon. The British 4th Armoured Brigade sends the 3rd and 7th Hussars to harass the Italian road-bound columns with flanking fire.
6. 6 February, 2100 hours. Some Italian tanks infiltrate south but are stopped by Combeforce.
7. 7 February, 0545 hours. Final Italian armoured attack fails to breakthrough roadblock.

El Magrun
Mixed convoys
II
7 H
II
VI
III
10 Bers
Units enter battle piecemeal over 24 hours
II
III
II
V
II
3 H
5
Beda Fomm
2
4
3
The Pimple
I
C
2 RTR
I
A
2 RTR
I
F
4 RHA
6
Antelat
7
I
C
11 H
II
2
RB
1
Sidi Saleh
N
VIA BALBIA
To Agedabia
Morning, 5 February
Afternoon, 5 February
Afternoon, 6 February
0
5 miles
0
5km

Australian infantry advance behind a Matilda tank from 7 RTR on the morning of 3 January 1941. The breach operation at Bardia was one of the best-executed British set-piece attacks of the North African campaign and conducted in accordance with pre-war doctrine. (Author's Collection)

the 4th Armoured Brigade advanced through the desert to Mechili. British intelligence was vaguely aware of Babini's armoured brigade, but not its strength or dispositions. As soon as Tobruk fell, the XIII Corps shifted gears into pursuit and began moving west, with its two divisions on diverging tracks. O'Connor was convinced that he had the 10ª Armata on the run and was willing to split up his forces to pursue multiple objectives.

However, Tellera was not retreating, but digging in. Although the bulk of the 10ª Armata's original combat units had been destroyed, the Italians were beginning to receive significant reinforcements. The 60ª Divisione Fanteria Sabratha (60th Infantry Division Sabratha) moved up to Derna to block the coast road at the Wadi Derna, which was a formidable natural obstacle. Babini's armoured brigade was deployed as a blocking force at Mechili with two medium tank battalions (III, V) with a total of 57 M13/40s, a tankette battalion (LX) and significant infantry and artillery support. On the day that Tobruk surrendered, a convoy reached Benghazi with the VI Btgl. Carri M. (37 M13/40) plus enough replacement medium tanks to convert the XXI Btgl. Carri L. into an M13/40 unit. Thus, Babini would soon have over 120 medium tanks, capable of standing up to the British cruiser tanks. In addition, Tellera knew that the lead elements of the 132ª Divisione corazzata 'Ariete' would be dis-embarking at Tripoli soon, with additional medium tanks. Once in theatre, the 'Ariete' division would assimilate Babini's brigade Although many of the Italian tankers were hastily trained on the M13/40, for the first time in the desert war the Italians would enjoy numerical superiority in medium tanks. On 23 January, Tellera ordered Babini to mount a counter-attack against the approaching vanguard of the 7th Armoured Division.

Caunter's advance from Tobruk toward Mechili on 21–23 January 1941 was plagued by lack of maps, failing radios and fuel shortages. The tank crews covered over 140 kilometres in two days of continuous driving, which exacted a great toll on the fragile cruiser tanks and the drivers, who were prone to fatigue-induced hallucination. Colonel Birks, in temporary command of the brigade, ordered Lieutenant Colonel Frederick W. Byass' 7th Hussars to envelop Mechili to the north in order to cut the track to Derna, while the rest of the brigade assembled east of the town. A sandstorm and poor communications led to the 7th Hussars not reaching the Derna track until 0500 hours on 24 January, at which point some of its vehicles had nearly exhausted their fuel. Two hours later, the A-echelon arrived and began refuelling the two squadrons. Byass had got lost during the night, leading to further confusion in 7th Hussars. Major Ronald F. Jayne's C Squadron, equipped with Mk VIb light tanks, was assigned to watch the Derna track, while the rest of the squadron refuelled. Around 1015 hours, Jayne spotted a large enemy column approaching on the track – it was a company of 14 M13/40 tanks from Tenente Colonnello Emilio Iezzi's V Btgl. Carri M. The Italian tanks spotted Jayne's covering force and immediately attacked, with some crews even firing on the move. Three British light tanks were quickly hit by 47mm fire and Jayne ordered a tactical withdrawal. However, the Italian tanks kept on coming and soon encountered thin-skinned vehicles from the A-echelon, still involved with refuelling operations. The M13/40s spewed machine-gun fire, scattering the British support personnel, while continuing to pursue Jayne's retreating light tanks. Jayne called for support, but A Squadron was only able to send three A-9s to meet the Italian tanks. In a brief skirmish, Captain D. C. Seymour-Evans managed to knock out two M13/40 tanks after firing 55 2-pdr rounds (not exactly good gunnery), but in turn, the Italians destroyed one of his cruisers and the other one was disabled when its 2-pdr gun malfunctioned (after a long desert march, the breech mechanism was likely fouled with sand and grit).[36] For the first time, Italian tankers had a British armoured unit on the run, if only briefly.

Byass arrived during the middle of this flap and requested immediate help from Lieutenant Colonel Alexander C. Harcourt's 2 RTR. However, there was a short delay when Harcourt decided to ask permission from brigade to move from his assigned position – not exactly a 'march to the sound of the guns' mentality. Harcourt then sent two of his cruiser squadrons to support 7th Hussars. Around 1120 hours, A Squadron 2 RTR found the Italian tanks stationary on a ridge near the track. The Italian commander had made the tactical mistake of leaving his vehicles 'sky-lined' (i.e. easily visible in silhouette atop high ground). In tank tactics, sky-lining is a major sin and to be avoided. Handed this advantage, the British cruiser tanks used their 2-pdr guns to good effect, knocking out seven M13/40 tanks for no loss. The rest of the Italian armoured force then withdrew. Altogether, in the action near Mechili, the Italians lost nine M13/40 (some accounts suggest only seven) and the British lost one A-9 and six Mk VIb tanks. Although the British claimed a tactical victory, the 7th Hussars had been roughly handled and it was clear that the Italians had a strong force of medium tanks in

A British soldier in the blocking force at Beda Fomm observes burning Italian vehicles to his direct front. It appears that the British have tried to form an obstacle with abandoned trucks. (Author's Collection)

Mechili. As a result, O'Connor ordered Creagh to encircle the town and destroy the Babini brigade once he had all of his division in place.[37]

After a few weeks' field service in North Africa, the Italian *carristi* quickly discovered that the M13/40 suffered from numerous technical deficiencies. The biggest problem was the lack of a radio, which made controlling even company-size units difficult. Internally, the turret was cramped, without a turret basket, and the main drive shaft that lay close to the hull was a serious obstacle for the crew. Like many early war tanks, the M13/40 was equipped with a hydraulic pump to provide power traverse for the turret, but the Calzoni device easily broke down, forcing crews to resort to manual traverse. Having been in this situation myself, when the power traverse failed on my M60A3 tank in the 1980s, I can attest that manually traversing a turret is very tiring and greatly slows down the rate of fire. On the other hand, the primary gunsight on the M13/40 was comparable to the Telescope No. 24 on the British Cruiser Mk IVA (A13) and the Italian tanks carried both APBC (Armour Piercing Ballistic Cap)/HE and HE ammunition (perforante 39 and ordinario 35), whereas the British tanks only had AP ammunition.[38] While the Cruiser Mk IVA had a mobility advantage over the M13/40, it could rarely use it over rocky desert terrain, lest it were to throw a track. The M13/40 also had somewhat better armoured protection than the Cruiser Mk IVA, which had been built for speed. In the hands of well-trained crews, the M13/40 was capable of adequate battlefield performance, but none of the Italian *carristi* were adequately trained on this tank during the first phase of the Desert War.

By 25 January, the Italian situation was not entirely unfavourable. Bergonzoli had stopped the advance of the 6th Australian Division at the Wadi Derna and Babini had halted the vanguard of the 7th Armoured Division at Mechili. The rainy season had just begun, which would favour the defence by turning desert tracks into muddy morasses. The British supply situation was also very poor, with forward units short of fuel and ammunition. While the Italian M13/40 tank was not great, it could defeat the British cruiser tanks under the right tactical conditions and the Italians now enjoyed a 2-1 numerical superiority over the depleted 7th Armoured Division's cruiser-equipped squadrons. However, O'Connor was aided by interference from Graziani (who had retreated to Tripoli), who believed that the British armoured force was much stronger than it actually was, so he ordered Tellera to pull Babini's brigade out of Mechili and move it north-west 70 kilometres to Slonta, to protect Bergonzoli's right flank. The result was that 7th Armoured Division entered Mechili unopposed on 27 January and Babini's brigade was unable to prevent Australian infantry from eventually crossing the Wadi Derna and outflanking Bergonzoli's defence. By the night of 28/29 January, Bergonzoli was forced to abandon Derna and fall back on Benghazi. Babini provided some tanks to form a rearguard for Bergonzoli's infantry, while the rest of his brigade was ordered to move across the desert toward Antelat, 146 kilometres south of Benghazi.

Despite the fact that the 10ª Armata had been forced out of a favourable position at minimal cost, O'Connor was incensed that Creagh's 7th Armoured Division had allowed Babini's brigade to slip away unmolested from Mechili. He also remarked about 'the disinclination of [our] armoured forces to take any action at night…' which was rather a cheap shot given that the 7th Armoured Division had successfully manoeuvred toward the Italian camps south of Sidi Barrani during the hours of darkness.[39] In fact, no army had yet trained to conduct significant armoured operations at night and O'Connor was confusing the Italian ability to conduct a night withdrawal in friendly territory with a night movement to contact into enemy territory. Despite his operational flair, O'Connor demonstrated little comprehension of mechanized operations, particularly in terms of operational constraints and logistics. When Creagh complained about fuel shortages and the necessity to cannibalize disabled tanks in order to keep even half his armour mobile, O'Connor chastised him as threatening the success of the campaign (which had actually far exceeded its original goals). O'Connor was telling Creagh to run his armour into the ground in order to achieve mission success, but kept shifting the operational objectives.

Creagh wanted to halt at Mechili and resupply his 7th Armoured

Division. He was also aware that the lead elements of the 2nd Armoured Division had arrived in Egypt and that two fresh armoured regiments, 3 RTR and 5 RTR, would soon be available. Major A. P. C. Crossley's B Squadron from the 2nd Armoured Division's King's Dragoon Guards (KDG), equipped with Marmon-Harrington armoured cars, had already reached Mechili on 2 February and was attached to the depleted 11th Hussars.[40] Since the Australian division was able to continue its advance toward Benghazi using its captured Italian tanks, this seemed like a good opportunity to rebuild British armoured strength in Libya in anticipation of follow-on operations. However, O'Connor made the snap decision on 3 February to send part of the 7th Armoured Division down the desert track to Msus, then to the coast, in order to cut off the Italian line of retreat from Benghazi. British reconnaissance suggested that the enemy was in full flight and O'Connor did not want to let them get away. The manoeuvre meant

A rather clean-looking crew of a British Mk VIb light tank smile for the camera on a cold morning in the desert, 30 December 1940. In reality, weeks of life in austere field conditions quickly ground down both crews and their vehicles. (IWM, E1501) moving an armoured force across over 200 kilometres of unfamiliar desert tracks, well beyond range of resupply. It was a bold, aggressive decision, with a high reward if it succeeded and total disaster if it failed.

Given the condition of Creagh's vehicles and limited fuel, O'Connor ordered Creagh to concentrate his best remaining tanks in Caunter's 4th Armoured Brigade and to leave the 7th Armoured Brigade (with just 1 RTR) near Mechili. At 0830 hours on 4 February, preceded by C Squadron of Combe's 11th Hussars and B Squadron KDG, Caunter's 4th Armoured Brigade (3H, 7H and 2 RTR) with 50 cruisers and 95 light tanks began the advance to Msus. Support forces were limited to one motor infantry battalion (2nd Battalion, Rifle Brigade), C Battery, 4 RHA (8x 25-pdrs) and one battery of nine 37mm anti-tank guns. Caunter's vehicles were provided two loads of fuel and promised that more would follow. From Mechili, Caunter's brigade had to move across 80 kilometres of very rough terrain, littered with boulders, which caused many of the flimsy fuel containers to burst. The Mk VIb light tanks had a particularly hard time on this rocky surface. On a good day, an A-10 cruiser could go about 100 kilometres on one load of fuel, but rainy weather and sandstorms turned the movement into an ordeal. Fuel was rapidly consumed and progress was so slow that it was clear that the brigade would not reach Msus by nightfall. Unwilling to undergo further criticism from O'Connor about allowing the enemy to escape, Creagh decided to form a fast pursuit group, based on Combe's 11th Hussars and the Support Group. CombeForce was sent ahead, reaching Msus by 1500 hours, then another 40 kilometres to the south-west. Combe's 11th Hussars covered 175 kilometres in a single day, compared to only 70 for Caunter's tanks.[41] British command and control was also stretched thin over this distance, since the wireless sets in use by 7th Armoured Division typically had a maximum range of just 60–80 kilometres.[42]

Italian air reconnaissance detected the British armoured pincer moving across the open desert and Tellera ordered the Regia Aeronautica to bomb the columns (which had virtually no fighter cover from the RAF).[43] The Italian air units had a new weapon – the AR-4 aerial-delivered mine – which was essentially an aerial denial munition. Italian S79 bombers sowed the route ahead of the British column with AR-4 mines, which the British dubbed 'thermos bombs'. Although designed to kill personnel, the AR-4 was capable of destroying trucks or damaging the tracks on tanks. The trucks of CombeForce were delayed by the Italian mines, but not stopped.[44] Furthermore, the desert tracks in this area were littered with unexploded ordnance, which would be a factor later in the campaign.

Despite the failure of the AR-4 mines to stop Caunter's advance, over half of the British tanks suffered mechanical problems en route. Tanks that fell out were left behind and hopefully recovered by following teams from the RASC, but one Mk VIb broke down and its crew were left in the desert alone for three weeks, with only minimal supplies. The desperate crew was forced to write 'HELP' in large letters in the sand and was eventually spotted by an RAF aircraft.[45] This

A bit more realistic. A very grubby-looking crew of an A-10 cruiser tank enjoy a meal, December 1940. The camaraderie of a tank crew is an important but often ignored element in victory in mechanized warfare. (Author's Collection)

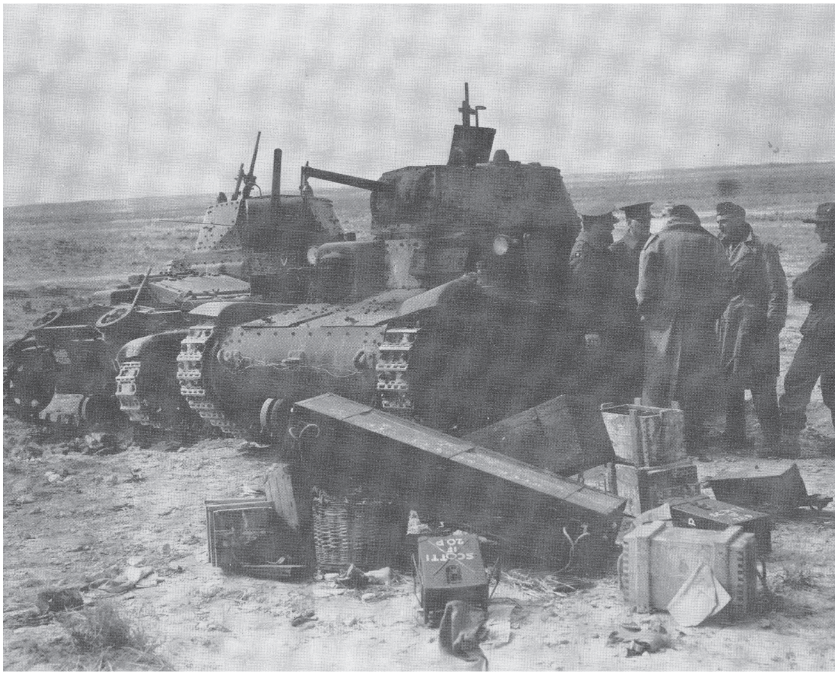
phase of the campaign also highlighted the operational mobility advantage of the Italian diesel-powered tanks over the British gasoline-powered tanks. For example, a single A-13 cruiser consumed about 3.5 litres of gasoline per kilometre in the desert, whereas an M13/40 consumed only about 1.75 litres of diesel per kilometre – a discrepancy of about 2-1 in the Italian favour. Diesel fuel is heavier (0.85kg/litre versus 0.75kg/litre for gasoline), which does become a factor in planning bulk logistics. In order to move 30 medium tanks 100 kilometres across the desert, the British needed about 4 tons of fuel, whereas a similar Italian armoured unit would only require 2.2 tons of fuel.

Creagh instructed Combe to proceed to the vicinity of Beda Fomm/Sidi Saleh and establish a blocking position, with Caunter's brigade to arrive as soon as possible. Combe's column pressed ahead, without maps and relying on a basic compass heading. On the morning of 5 February, C Squadron of 11th Hussars reached Antelat and sent small patrols toward Sidi Saleh and Beda Fomm. By noon, the motorized infantry and artillery arrived and Combe established a blocking position to stop enemy traffic along the Via Balbia. Many of the British vehicles ran out of fuel just as they reached the coast. Even before CombeForce reached the coast, Tellera was alerted to the British outflanking manoeuvre by intercepted radio traffic from the 11th Hussars.[46] However, Babini's brigade was forming the rearguard from Benghazi and not immediately available to prevent the British from reaching the coast road. Instead, a large column of Italian motor transport vehicles, mostly support troops and one battalion of *bersaglieri*, appeared around 1430 hours and came under fire from the roadblock. The Italians tried to slip past the roadblock but suffered heavy losses to artillery and machine-gun fire. The lead elements of Caunter's brigade reached Antelat by 1630 hours and the 7th Hussars was sent ahead, attacking into the flank of the Italian column. The Italians were shocked to see enemy tanks across their line of retreat and this realization caused chaos among the support troops. From this point on, the Italians at Beda Fomm were wrong-footed and Tellera was unable to effectively organize his numerically superior forces. By dusk, the Italian column had been repulsed and well over 1,000 prisoners taken, but CombeForce was now short of ammunition as well.[47]

Both sides shifted forces late on 5 February. Bergonzoli intended to commit his reserve, Raggruppamento Bignami, which had two medium tank battalions (VI, XXI), two *bersaglieri* battalions and an artillery battalion to deal with the British road block. However, Creagh sent Lieutenant Colonel George J. N. Culverwell's 1 RTR (10 cruisers and 8 lights) and the rest of the Support Group to occupy Sceleidima, north of Beda Fomm, and ran into Raggruppamento Bignami. The result was an inconclusive meeting engagement, but it effectively kept both Bignami's tanks and 1 RTR out of the initial action near Beda Fomm. Bergonzoli also tried to shift Babini's brigade southward, but had to keep part of it to protect his rearguard, because the Australians were pressing hard in pursuit. Consequently, Bergonzoli was not able to mass much combat power to break through the British roadblock near Beda Fomm and would be forced to fight a piece-meal battle. Nor would either side have any significant air support in the coming action.

A heavy, cold rain fell during the night of 5/6 February, soaking the battlefield. Large numbers of Italian vehicles congregated about 5 kilometres north of the British blocking position, but the personnel were amazingly passive and sent out no patrols. Nor did the Italians try to slip past the roadblock in the darkness, even though the British were spread very thin. Meanwhile, Lieutenant Colonel Alexander C. Harcourt deployed his 2 RTR (12 cruisers and seven lights) in hull-down positions near 'the Pimple', a slight elevation 7 kilometres west of Beda Fomm. Major Gerald Strong's A Squadron, equipped with about six A-13 cruisers, occupied hull-down positions, with just their turrets exposed. Major James Richardson's C Squadron, equipped with about six A-9 and A-10 cruisers, was located further east, near Mosque Ridge. Eight 25-pdr guns from F Battery, 4 RHA were also deployed on Mosque Ridge. Caunter deployed the light tanks of the 3H and 7H to cover 2 RTR's right flank and watch for any attempts to outflank the blocking position. All of the British armour was deployed perpendicular to the Via Balbia, forming a large L-shaped ambush, with CombeForce forming the base.

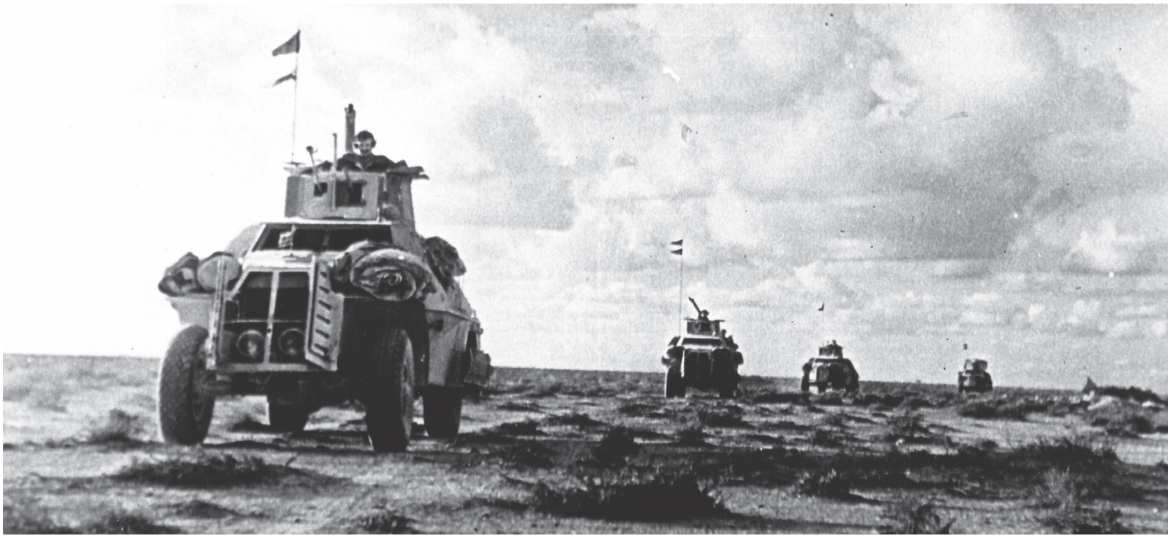
At dawn (0630 hours), Major Strong spotted the stationary Italian forces north of his position, but well beyond range of his 2-pdr guns. Morning brought more cold, heavy rain, which limited visibility. Tellera and Babini



British officers confer next to two captured Italian M13/40 tanks from the V Btgl. Carri M. at Beda Fomm, February 1941. The Italian 10a Armata lost 101 M13/40s in this action, although 39 were captured intact. (Author's Collection)

were finally able to get enough of their tanks moving south around 0830 hours, but without infantry or artillery support – the lack of radios now proved a critical weakness. Nor did the Italians conduct any reconnaissance to identify the British positions; this would actually have been a good mission for the CV-35s, but very few were left. Babini's armour advanced tentatively alongside the coast road in separate columns, in wedge formations, uncertain where the enemy was located. Without radios, coordinating these columns was nearly impossible. It was not until the lead Italian tanks from Tenente Colonnello Emilio Iezzi's V Btgl. Carri M. were within 600 metres of the Pimple that they spotted Major Strong's hull-down A-13 cruisers, which was too late. Unwittingly, the Italian tanks had driven straight into A Squadron's engagement area and eight of ten M13/40s were quickly destroyed.[48] Strong then ordered his squadron to back up, shift positions and engage the next Italian company, knocking out seven more M13/40s. Major Richardson's C Squadron moved up on line and engaged a third Italian tank company, knocking out eight more enemy tanks. Iezzi's battalion was demolished and he was wounded in the action. Apparently none of the Italian tanks were able to return fire before they were destroyed. Both British squadron commanders used radio to co-ordinate their movements and direct fires, which greatly increased the effectiveness of their depleted units. Thus in a matter of minutes, three Italian tank companies had been mauled and 25 M13/40 knocked out, at no cost to 2 RTR.[49] From the British point of view, the opening round at Beda Fomm was a textbook example of how to conduct a successful anti-armour ambush.

Although stung by this setback, Tellera managed to get some Italian artillery into action and ordered Babini to bring up more tanks from Tenente Colonnello Carlo Ghioldi's III Btgl. Carri M. Tellera mounted one of Babini's tanks and decided to personally lead a second breakthrough attempt, which began around 1115 hours. Now the Italians knew where the British armour was located – near the Pimple – and they pounded this hillock with a barrage from 75mm and 105mm howitzers. By 1200 hours, four of 2 RTR's cruisers were knocked out, including Richardson's A-10, by Italian direct and indirect fire. Another Italian column approached the Pimple, with at least a company of escorting M13/40s. The 2 RTR managed to knock out three M13/40s from this group, but the cruiser squadrons had nearly exhausted their ammunition and were down to just eight tanks. Second Lieutenant Norman T. Plough, a tank commander in A Squadron, reported that he started the action with 112 rounds of 2-pdr ammunition (they had carried extra ammunition externally), but expended the last one by around noon. Most of the machine-gun ammunition was also gone, having been expended against the large number of enemy trucks.[50] Harcourt was forced to pull his two squadrons back from the Pimple to cross-level the remaining ammunition. In order to harass and slow the Italian column while 2 RTR disengaged, Caunter ordered both 3 H and 7 H to manoeuvre and engage the enemy's flank. The 3rd Hussars had been reinforced with B Squadron from 2 RTR (with six A-9, A-10) and it managed to knock out three more M13/40s, but one of its A-10s was disabled and the crew captured. Nevertheless, the Italians occupied the Pimple and appeared poised to push past the hard-pressed 2 RTR. Unknown to the British, Tellera had been mortally wounded by shell splinters in his lung when his tank was hit, leaving Bergonzoli and Babini to try and organize the breakout attempt. Although short of ammunition, the attached 25-pdr batteries from the 4 RHA pounded the Italian column all day, wreaking great havoc with the soft-skin vehicles, and generally making life difficult for the enemy.



The KDG was the first British unit to encounter the lead elements of the Afrika Korps on 24 February 1941. In the initial clash near El Agheila, the KDG lost two of its Marmon-Herrington Mk II armoured cars to the better-armed German reconnaissance vehicles. (Author's Collection)

British armoured cars and an A-13 cruiser abandoned in Mersa Brega, 31 March 1941. The ill-prepared British 2nd Armoured Division fumbled its covering force mission and was soon in headlong retreat. (Author's Collection)

By late afternoon on 6 February, Caunter's brigade was hard-pressed and he appealed to Creagh to release Culverwell's 1 RTR to support the defence at Beda Fomm. Due to a variety of communications issues, this request took longer than expected and 1 RTR also spent time refuelling, so no reinforcements arrived until it was getting dark. By the time the two squadrons from the 1 RTR did arrive, they had difficulty identifying friend from foe due to heavy rain and darkness, so they simply harassed the flanks of the Italian column.[51] Once 1 RTR pulled out of the action at Sceleidima, Bergonzoli was able to shift the armour from Raggruppamento Bignami toward Beda Fomm as well. The crews of the VI Btgl. Carri M. had been hastily trained in Italy before arriving in North Africa two weeks before, but the crews of the XXI Btgl. Carri M. were completely untrained on their new tanks. The attempt to convert *carristi* to the M13/40, while engaged in a withdrawal, left this battalion incapable of little more than simple movements; clearly there had been no time to train the battalion on gunnery or tactics. Thus, Babini sent a tank group from the VI Btgl. Carri M. to push south from the Pimple, which lost three tanks to fire from Richardson's C Squadron, now reduced to just three operational cruisers. After sunset, at 1717 hours, Bergonzoli ordered the remaining Italian armour to bypass 2 RTR to the west by using the sand dunes near the coast for cover. Thanks to the reduced visibility, a group of tanks did reach CombeForce around 2100 hours. However, the British had managed to

Lieutenant Colonel Roy M. Jerram (1895–1974), commander of the 7 RTR during Operation *Compass*. Jerram was a decorated tanker from the First World War and his leadership of 7 RTR in 1940 was exemplary, but he saw no further service in the Middle East. The British Army only had a small pool of experienced pre-war armour leaders and often failed to put the right man in the right position. (Author's Collection)

lay some anti-tank mines, which disabled four M13/40s and halted the armour. Some groups of personnel and vehicles succeeded in infiltrating past the roadblock in the darkness, but not many. According to the 11th Hussars War Diary, one Italian light armoured regiment commander made it to Agedabia, but was captured after the battle.[52]

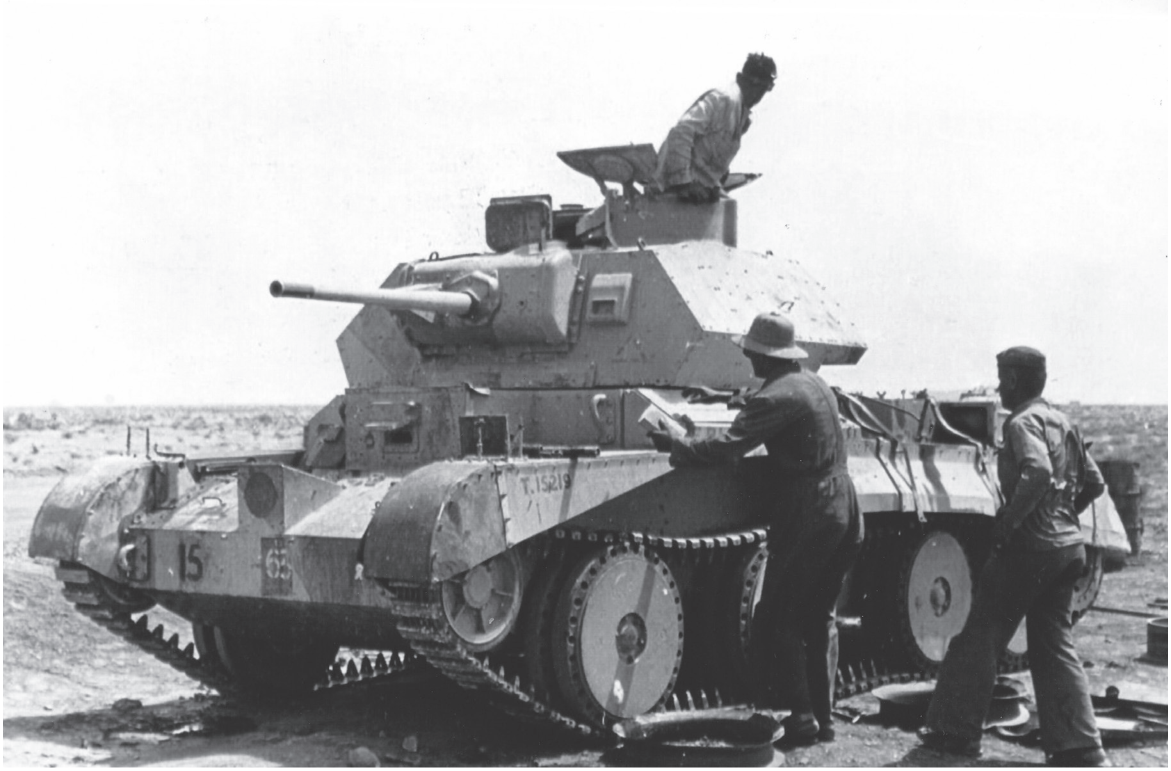
Before dawn on 7 February, around 0545 hours, the Italians made one last effort to break through the British roadblock. Approximately 23 Italian medium tanks were still operational and they advanced at first light. The British portee-mounted 37mm anti-tank guns from 106 RHA engaged the on-coming Italian armour and knocked out multiple tanks, but lost eight of their nine guns.[53] In the end, it was C Battery, 4 RHA, lobbing 120 25-pdr rounds into the enemy tanks at pointblank range, which broke the back of the final Italian attack. Soon thereafter, the rest of 4th Armoured Brigade closed in on the Italian column but found all resistance had collapsed. Over the course of the rest of the day, the British took in thousands of prisoners (about 20,000 altogether), including both Bergonzoli and Babini. The 10ª Armata had been annihilated and a great victory had been won, but the XIII Corps had no strength left for an advance to Tripoli to complete the conquest of Libya. Indeed, O'Connor had literally run the 7th Armoured Division into the ground and this veteran formation would require many months to refit – a result of the campaign which is often ignored. Altogether, 80 per cent of the original WDF tracked and wheeled vehicles were either lost or no longer serviceable.[54] Yet it was also extremely rare in the Second World War for a single armoured division to achieve such strategic results in a campaign; the 7th Armoured Division visibly demonstrated that the British pre-war investment in tanks was fully vindicated.

According to Liddell Hart, the British counted 101 M13/40 tanks on the Beda Fomm battlefield; 48 had been hit by 2-pdr rounds, eight by other guns and six by undetermined damage.[55] A total of 39 M13/40 were captured intact, mostly from the XXI Btgl. Carri M., which did not engage in action.[56]

A tankette battalion, the LX Btgl. Carri L., was also destroyed at Beda Fomm. Although British sources emphasize the number of Italian prisoners taken at Beda Fomm, they are strangely silent about the number of enemy killed and wounded on the battlefield. At least half the Italian *carristi* at Beda Fomm were killed or wounded in action and losses of infantrymen and artillerymen must also have been significant. Some of the British tanks fired 2-pdr APHE rounds, which it was later found were responsible for causing a great many fatalities among Italian *carristi*.[57] While the Italian lack of radios on their tanks was a significant factor in their defeat at Beda Fomm, it was the not the sole reason for defeat. Rather, it was the lack of training on the new medium tanks that prevented commanders from achieving positive results on the battlefield. British tankers – for the most part, still pre-war regulars – were well trained and capable of shooting, moving tactically and communicating; this was the source of their battlefield success. The ability of Italian tankers to cooperate with their artillery and air support was noticeable in the opening stages of the campaign, but lapsed during the desperate breakout attempt at Beda Fomm. Had Italy possessed medium tanks prior to the outbreak of hostilities and had adequate time to train officers and men on how to get the most out of their tanks, the result at Beda Fomm might have been different. Indeed, Italian armoured performance had nowhere to go but up after this disaster and the British would not encounter such un-trained foes again in North Africa.

From the British perspective, the victory at Beda Fomm was a complete vindication of their pre-war armoured doctrine. Harcourt's 2 RTR single-handedly destroyed about 40 Italian tanks, but suffered only three killed and four wounded.[58] Although the mechanical unreliability of British tanks was a major concern, one quarter of the original tanks in the Western Desert Force managed to advance over 800 kilometres on their own tracks and were still combat effective when they reached their objective. While the Rolls-Royce armoured cars and Mk VIb light tanks clearly needed to be replaced with newer vehicles, the British mechanized cavalry had performed superbly during the

Action at Mersa Brega. The Germans have brought up an 8.8cm Flak gun to engage the tanks of 5 RTR, which soon withdraw. The crew of a nearby Pz IV watches the action with interest. (SDZ, 00333390)



5 RTR arrived at the front in Libya at the end of March 1941, but half of its tanks dropped out en route. Here, RAOC technicians are working on an A-13 (Mk IVA) cruiser tank. (Author's Collection)

campaign. Indeed, the 11th Hussars was the star of the campaign, far more than the hard-hitting but ephemeral 7 RTR. The areas where there were deficiencies – such as lack of HE rounds for the 2-pdr tank guns and limited organic air defence in armoured units – had not exacted a significant price on the battlefield. Likewise, the British conduct of combined arms warfare appeared to be competent, if economical in terms of resources. The most significant deficiency – which received short shrift in the afterglow of Beda Fomm – lay in mobile logistics, which proved barely adequate due to insufficient transport, faulty fuel containers and failure to lay in stocks of spare parts to support extended mechanized operations.

CHAPTER 4

THE AFRIKA KORPS ARRIVES

INTERLUDE, FEBRUARY 1941

'We are delighted that you have got this prize [Benghazi] three weeks ahead of expectation, but this does not alter… our previous directive, namely, that your major effort must now be to aid Greece and/or Turkey. This rules out any serious effort against Tripoli….'[1]
Churchill to Wavell, 12 February 1941

In the immediate aftermath of Beda Fomm, Combe's exhausted 11th Hussars occupied El Agheila on 9 February, but that was the British high-water mark for 1941. Combe's regiment was so depleted after Beda Fomm that it was reinforced with the Number 2 Armoured Car Company RAF (with four Fordson armoured cars). Despite the fact that the Italians still had four intact infantry divisions near Tripoli and the 132ª Divisione corazzata 'Ariete' had just arrived, the British War Cabinet decided that Commonwealth forces in Libya could be greatly reduced and a defensive stance adopted. Churchill insisted that Greece and Turkey were now the priority for Wavell's Middle East Command. Creagh's 7th Armoured Division was sent back to Egypt to rest and refit. The XIII Corps lacked the ability to conduct major tank overhauls in the field (even if it had surplus engines, transmissions and track, which it did not) and the road distance back to the repair depot in Abbassia was over 1,400 kilometres. Consequently, few of the 7th Armoured Division's worn out tanks would actually be repaired. Instead, personnel and motor transport returned to Egypt, but O'Connor expected the division to be eventually re-equipped with new tanks from England. O'Connor, who had been suffering from a stomach ulcer during the later stages of Operation *Compass*, was also ordered back to Egypt to recuperate.

Following the defeat of the 10ª Armata, the attention of Churchill and his War Cabinet shifted from Libya to Greece, where German invasion appeared imminent. Despite vacillating back and forth over the wisdom of the decision, on 24 February, the War Cabinet approved the plan to dispatch an expeditionary force to Greece forthwith.[2] Most of the troops for this expeditionary force would come from O'Connor's command, including the veteran 6th Australian Division and an armoured brigade. In its place, the partly trained 9th Australian Division would be sent to hold Libya. The only significant British armoured force left in Libya was the 3rd Hussars, equipped with 26 Mk VIb light tanks and 26 captured M13/40s.

Brigadier Harold V. S. Charrington's 3rd Armoured Brigade (3 RTR, 5 RTR, 4th Hussars) from the 2nd Armoured Division began unloading its 154 tanks at Suez in late December, but this formation was far from ready for active operations. Aside from Charrington's armoured brigade, the 2nd Armoured Division only possessed one motorized infantry battalion, an artillery battalion and an engineer company for support troops. Furthermore, many of the division's cruiser tanks were in poor mechanical condition – having been abused as training vehicles in England – and needed new engines and tracks. Wavell, eager to see the brigade off to the front, unhelpfully said that he hoped 'the old tracks would give less trouble in the desert than they had at home'.[3] At times, the obtuseness of senior British army officers in the early years of the Second World War about tanks – a weapon their army pioneered over 20 years before – is difficult to understand. Major General Tilly flew out to Egypt to link up with his division in early January, but died in an air crash. Over a month later, Major General Michael D. Gambier-Parry was assigned to command the 2nd Armoured Division. Gambier-Parry had joined the Royal Tank Corps in 1924 but had never really seen much service with tanks and had instead moved into high-level staff and diplomatic assignments. Since the start of the war, he had been commanding an infantry brigade in Malaya, which was far removed from the experience needed to command an armoured division in the desert.

Wavell was uncertain what to do with the 3rd Armoured Brigade, since he alerted the unit for possible deployment to Sudan or Libya. On 22 February, it was decided to deploy part of the unit (minus 5 RTR), with the best tanks, to Greece and to re-designate it as the 1st Armoured Brigade. Likewise, the division's support group was stripped of personnel, motor vehicles and spare parts to reinforce the expeditionary force going to Greece.[4] Gambier-Parry was then ordered to proceed with his 2nd Armoured Division Headquarters and Support Group to Libya. Brigadier Reginald G. W. Rimington's 3rd Armoured

The first German tanks from the Afrika Korps arrived in Tripoli in late February 1941, but the main body did not arrive until March. Here, a Pz III Ausf H with short 5cm Kw.K 38 L/42 gun is unloaded. (Author's Collection)

Brigade had been sent out from England with the *Apology* convoy, but when his armoured regiments were assigned to 7th Armoured Division, his headquarters was reduced to a cadre status. In mid-February 1941, Rimington's 3rd Armoured Brigade was re-activated, assigned to 2nd Armoured Division and given the 5 RTR. In addition, the 7th Armoured Division transferred personnel from the 3rd Hussars and 6 RTR to round out the brigade, but without tanks. Rimington was an experienced armour officer who had previously commanded the 2 RTR, but his brigade possessed only 30 Mk IVA (A-13) cruisers and 45 Mk VI light tanks. Initially, the 5 RTR moved by rail to Mersah Matruh, but thereafter it was forced to move the rest of the way to Libya on its own tracks. Along the way, the 5 RTR lost half of its tanks falling out en route due to mechanical defects. By the time the 5 RTR reached Agedabia in late March, its remaining tanks were all due for overhauls – but there were neither the facilities nor parts to accomplish this on the barren desert south of Beda Fomm.

Upon arriving in Benghazi in late February, Rimington was also provided with 48 captured Italian M13/40 tanks, which were divided between the 3rd Hussars and 6 RTR. The British crews tried to train on the captured Italian tanks, but lack of radios made it impossible to employ their normal tactics. Furthermore, the British had not captured any large stockpile of diesel fuel for the M13/40s' Fiat engines, which greatly limited their mobility. Thus, the 3rd Armoured Brigade consisted of a motley collection of worn-out and unfamiliar tanks, with very limited fighting capability. The 2nd Armoured Division's lack of mobility greatly reduced the combat effectiveness of the formation, but Wavell deemed the risk acceptable at the time. British intelligence noted the arrival of German forces in Sicily and, thanks to the

A Pz III crew soon after arrival in North Africa, sporting their new sun helmets. Panzer crews rarely wore these bulky helmets and quickly shifted to soft caps. Note the large number of external fuel canisters and the relative cleanliness of the tank. (SDZ, 00333374)

ability to decrypt some of the Luftwaffe's encoded Enigma communications, Wavell was aware that the Germans might send a small ground expeditionary force to Libya or Tunisia.[5] However, Wavell's staff assessed that the enemy would be unable to mount a serious counter-offensive in Libya until the summer, so one poorly equipped brigade from the 2nd Armoured Division should suffice in an economy of force role until the 7th Armoured Division was rebuilt.[6] Just in case, Lieutenant General Sir Philip Neame was authorized to conduct a delaying operation back to Benghazi if the enemy did mount a serious counter-offensive.

Meanwhile, Graziani was removed from command in North Africa and Gariboldi was promoted to fill his role as theatre commander (Superasi). The lead elements of Generale di Divisione Ettore Baldassarre's 'Ariete' division began arriving in Tripoli on 24 January, but it would take nearly a month to transfer all its component units from Italy. Since the four battalions of M13/40 tanks (III, V, VI, XXI) that had been intended to equip the 'Ariete' and 'Centauro' armoured divisions had already been destroyed, Baldassarre's division was initially an armoured division in name only. Instead, three newly reformed light tank battalions (I, II, III btgl. carri L.) with 117 CV-35s were provided to 'Ariete', along with the 8º Reggimento Bersaglieri (three infantry battalions), two light artillery battalions and a few small support units.[7] Even when Maggiore Alberto Andreani's VII Btgl. Carri M. arrived in March with 46 M13/40 tanks, the 'Ariete' Division was still weaker than Babini's BCS had been before Beda Fomm. Andreani's battalion had been hastily thrown together in Verona and shipped to North Africa with minimal training, resulting in a unit that could barely move.[8] As a result, the 'Ariete' Division would require a substantial period of time before it could be used in combat. Gariboldi deployed the 'Ariete' Division at Sirte, 275 kilometres from the nearest British positions near El Agheila. The only positive development from the Italian point of view was that Ansaldo had finally increased the production of the M13/40 tank to 60 per month, which would help to replace the losses from Beda Fomm. As a result, the Italian War Ministry upgraded the organization of the medium tank battalion to three tank companies instead of two, thereby increasing the total number of tanks from 37 to 46.

Five days after the British victory at Beda Fomm, Generalleutnant Erwin Rommel arrived in Tripoli via Ju-52 transport plane with a small staff and reported to Gariboldi. Hitler's Directive 22, issued in January, authorized the movement of a small German air-ground expeditionary force to North Africa. Although Rommel was ordered to cooperate with the Italians, he reported to the Oberkommando des Heeres (OKH). Based upon Hitler's guidance, the OKH's *Unternehmen Sonnenblume* (Operation *Sunflower*) was simply intended to provide a blocking force (*Sperrverband*) under Rommel's command to prevent a complete Italian collapse. Given the apparent Italian inability to stop British armour, Rommel's force was optimized for defensive anti-tank roles, not manoeuvre warfare. Originally intended to consist of only a single German division, von Thoma's report influenced the OKH to increase the commitment to two divisions in early February.

On 13 February, the Luftwaffe also began deploying some units to Bir Dufan airbase near Tripoli, including two Stuka groups (I./St.G.1 and II./St.G.2) with about 50 Ju-87 dive-bombers and one *Staffeln* (8./ZG 26) with 18 Bf-110D fighter-bombers. Later, in mid-April, I./JG 27 would also arrive with about 25 Bf-109E fighters. General Stefan Fröhlich was made Fliegerführer Afrika and assigned additional units as they became available.[9] Although small, Rommel's Deutsches Afrika Korps (DAK) would enjoy powerful air support from the start of its operations in North Africa. Fröhlich immediately sent his aircraft off to harass the British covering forces known to be operating near El Agheila. A Squadron of the 11th Hussars reported in its diary on 14 February that 'at 1000 hours 17 Me 110s flew down the road very low, machine gunning everything in sight'.[10] Although one Bf-110 was shot down and its crew captured by the 11th Hussars, the attack confirmed that German units were now operating in North Africa. The Luftwaffe attacked the British forward positions several more times over the next two days, knocking out three armoured cars. The Luftwaffe also brought a *Staffel* of Hs-126B reconnaissance aircraft, which began to identify forward enemy positions around El Agheila and Agedabia. In addition, the strong Luftwaffe presence in the area prevented the British from using the port of Benghazi as a supply base, which constrained British logistics beyond Agedabia.

On the evening of 14 February, the lead elements of Generalmajor Johannes Streich's 5. leichte-Division arrived in Tripoli: the Aufklärungs-Abteilung 3 (A.A. 3) and Pz.jg.-Abt. 39 personnel worked

Elements of Pz.Regt. 5 pass through the Arco dei Fileni (Marble Arch) around 23 March 1941 after a 600-kilometre road march from Tripoli. Rommel rushed his Panzers forward with minimal time allowed for maintenance, crew rest or acclimatization to an austere theatre – even though his mission was ostensibly defensive in nature. (Author's Collection)

through the night to off-load all equipment in just 12 hours. After a brief parade to show the German presence in Tripoli, Rommel sent a *Vorausabteilung* (forward detachment) off to Sirte under Major Irnfried Freiherr von Wechmar (commander of A.A. 3). Vorausabteilung Wechmar primarily consisted of motor vehicles, about 24 armoured cars, a company of motorcycle scouts and a handful of towed 3.7cm Pak guns. Gariboldi's 10ª Armata had the Pavia and Bologna infantry divisions holding a defensive position at Sirte, with 'Ariete' held in reserve west of Sirte. A small ad hoc motorized unit, known as the Santamaria battalion (under Maggiore Mario Santamaria), was holding a blocking position in the narrow Mugtaa defile west of El Agheila.[11]

Von Wechmar's vanguard was able to move forward through the Italian screening forces, reaching Nofaliya on 19 February. Urged on by Rommel, von Wechmar advanced to the Mugtaa defile and eventually bumped into a British armoured car patrol on the afternoon of 20 February. Second Lieutenant Edgar T. Williams, an Oxford-educated scholar turned cavalryman, was leading a troop from C Squadron KDG when they came under fire from a German armoured car (possibly a Sd.Kfz. 231). After returning fire, Williams retreated and reported the first ground contact with German forces – which was apparently not fully believed.[12] In contrast, Rommel flew forward to Nofaliya and ordered von Wechmar to press on and secure some prisoners for interrogation. By this point, Combe's 11th Hussars had withdrawn to Egypt to refit, leaving the KDG (with its Marmon-Herrington Mk II armoured cars) to screen the El Agheila area.

Just before dawn on 24 February, three of von Wechmar's armoured cars and some motorcycle troops reached the western outskirts of El Agheila and established an ambush near the abandoned Italian fort. Soon thereafter a troop of KDG armoured cars appeared and were engaged. A second troop and a pair of Australian 2-pdr anti-tank guns also arrived, but the Germans got the better of the skirmish; two of the KDG's Marmon-Herrington Mk II armoured cars were destroyed and three soldiers captured.[13] After this, the KDG was told to avoid unnecessary engagements with German armoured cars, because their 2cm guns gave them superior firepower over the 7.7mm Vickers machine-guns on the thin-skinned Marmon-Herrington Mk II.[14] On 29 February, Rommel ordered von Wechmar to occupy the Mugtaa defile, just 25 kilometres west of El Agheila, and act as a covering force while the rest of the DAK began assembling behind it.[15]

Although it was clear that British forces around El Agheila were thin on the ground, Rommel could not undertake any real offensive action until he had the rest of the 5.lei.Div. in hand. In the first 11 days, a total of 7,232 German troops and 2,366 vehicles were landed in Tripoli, but it would take six weeks to move the entire division to North Africa.[16] Oberst Herbert Olbrich's Pz.Regt. 5 (with two battalions) did not arrive until early March. Without pausing to allow the troops to adapt to desert conditions, Rommel immediately sent Olbrich's panzers to the front. Leutnant Joachim Schorm was a platoon leader in the 6. Kompanie of the II./Pz.Regt. 5 and recorded his experiences in his diary.[17] The road distance from Tripoli to Sirte was 425 kilometres and it required each Panzer-Abteilung four days to complete the movement, which was undertaken at night.[18] Schorm noted accidents during the night march, with two tankers killed in the 5. Kompanie. It was another 125 kilometres to the division assembly area near Nofaliya and by the time that Olbricht's Panzers finally reached the forward areas on 23 March, they had travelled over 600 kilometres on their own tracks; this was an extraordinary amount of non-combat wear and tear on the tanks' suspensions, track, engines and transmissions. The Panzerwerkstattskompanie in Pz.Regt. 5 probably had several Sd. Ah. 116 tank transporters in its recovery unit, but clearly this was insufficient to lift more than a handful of tanks (and likely reserved for vehicles that fell out en route to the front). Consequently, even non-combat movements of armoured units in North Africa could inflict serious mechanical damage on tanks.

As other units arrived in Tripoli, Rommel also sent them to the front, including the I./FlaK 33 (with 18 8.8cm Flak guns), Pz.jg.-Abt. (Sfl) 605 (with 27 Panzerjäger I tank destroyers), two motorized machine-gun battalions (which had a total of 20 SPW armoured personnel carriers) and four batteries of field artillery. Oberstleutnant Gerhard Graf von Schwerin was assigned to command the two motorized machine-gun battalions under his Regimentsstab z.b.V. 200, an improvised headquarters that served as a substitute for a Panzer division's normal motorized infantry regiment. It was not much of a force – really just a reinforced brigade – but Rommel wanted to use it against the

Rommel sent his armoured reconnaissance units out in front to probe around El Agheila. Here, an Sd.Kfz.263 (8-Rad) radio vehicle is on the left and a Sd.Kfz.223 in the centre. (Author's Collection)

British covering force as soon as possible. Gariboldi was not keen on offensive action, but agreed to subordinate the 'Ariete' division and the 27ª Divisione Fanteria 'Brescia' (which had four infantry and one artillery battalions at the front) to the DAK. Rommel used the 'Brescia' division to hold the front line, while 5.lei.Div. assembled behind it.

From the beginning in North Africa, Rommel demonstrated a flagrant disregard for logistic issues. The DAK arrived in Tripoli without a normal allocation of division or corps-level transportation units and was initially heavily dependent upon the Italians for motor transport. In contrast to a typical 1941 Panzer division, the 5.lei.Div. only had about two-thirds the normal allotment of supply trucks, enough to move about 360 tons in one lift.[19] This amount of logistic support was tailored to meet the requirements elaborated in an OKH study on the deployment of a single division-size blocking force to North Africa, but it was grossly insufficient to support long-range mechanized offensive operations.[20] Just to move Olbrich's Pz. Regt. 5 to El Agheila required over 300,000 litres of fuel, or 250 tons. At best, a motorized transport column could reach the forward areas and return to Tripoli in about two days, meaning that as Rommel's forces moved further eastward, fewer and fewer supplies could be brought forward. Given the limited amount of trucks in theatre, it was going to be difficult and time-consuming to move large quantities of fuel forward to El Agheila, roughly

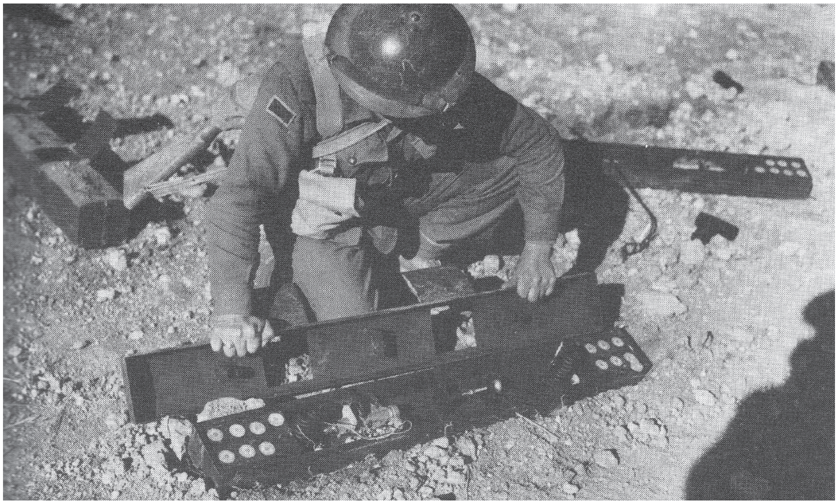
600 kilometres from Tripoli. Instead, Rommel ordered his quartermaster, Major Ott, to use Italian barges to move bulk supplies forward to Ras el Ali, 43 kilometres west of El Agheila.[21] From Ras el Ali, Ott moved the supplies to a depot located 5 kilometres away, near the Arco dei Fileni (Marble Arch) on the Via Balbia. By late March, Ott had managed to assemble about 4 V.S. of fuel at this forward supply depot, sufficient for about a 400-kilometre advance. Thanks to Luftwaffe air cover, neither the RAF nor Royal Navy seriously interfered with this Axis logistic build-up.

It was soon apparent that the 5.lei.Div. was not prepared to operate in the desert. Olbricht's Panzers arrived in Tripoli still painted in dark grey (*dunkelgrau*), although Berlin authorized them to repaint their vehicles with a camouflage mix of yellow-brown (*gelbbraun*) and grey-green (*graugrün*); Schorm recorded that his platoon was repainted on 23 March. Before leaving Italy, the Germans had tried to modify their tanks for a tropical environment by hastily drilling large holes in the engine deck covers on their tanks, thinking this would increase air flow to the engines. Instead, it simply let more dust and sand in, which mixed with engine and transmission oils to produce a thick sludge – eventually leading to frozen piston rods. The standard German air filters also proved unsuitable in the desert environment, leading to more dust contamination issues. The German quartermasters also seriously underestimated the food and fresh water requirements for fighting in the desert, which soon led to increasing numbers of sick personnel in the DAK. Even the ubiquitous *Gulaschkanone* (goulash cannon) field kitchen proved unsuitable for North Africa because it required wood for cooking fires – and there was no wood in the desert. Instead, the Afrika Korps soldiers were forced to subsist on tinned food for long periods of time. While moving toward the front, the DAK also encountered its first sand storms and found them both disruptive (units were forced to stop) and disorienting. By any measure, the troops and vehicles of the DAK needed time to acclimatize to the desert – but Rommel had no intention of allotting any substantial time for pre-combat preparations.

On 18 March, Rommel returned to Berlin and asked the OKH for permission to conduct a reconnaissance in force toward El Agheila and, if possible, Mersa Brega.[22] Generaloberst Franz Halder, chief of the OKH, agreed to a limited advance, but regarded a push toward Tobruk or Egypt as impractical until mid-1941 or later (Halder was justly concerned that Rommel would divert resources away from the impending invasion of the Soviet Union, which was intended to be the decisive operation of the war).[23] Ignoring Halder, Rommel then had the temerity to make a direct appeal to Hitler, which was far beyond the norm for any other German corps commander. Hitler, focused on the up-coming invasion of Greece and Yugoslavia, was not interested in sideshow offensives in Libya.[24] Furthermore, German intelligence estimated that the British had at least four divisions in Libya (including two armoured) and Rommel was told to remain on the defensive until after the 15. Panzer-Division arrived in mid-April.[25] As a result, neither the British, nor the

OKH, nor the Italians expected Rommel to make a move in Libya until at least May. However, Rommel had no intention of marking time in a backwater theatre. Instead, as soon as he returned to Libya, Rommel began preparations to mount an offensive. As a preliminary step, Rommel ordered the 5.lei.Div. to take El Agheila on 24 March, which was easily accomplished. The British covering force units had already evacuated the town, but they had left a few anti-tank mines behind, which destroyed a single Pz III Ausf G tank (two crewmen were killed) from 5. Kompanie and an armoured car from A.A. 3.[26] With El Agheila in hand, Rommel was now within striking range of the Allied forces deployed between Mersa Brega and Agedabia. Sensing that the enemy forces opposing him were weaker than estimated by the OKH intelligence staff in Berlin, Rommel intended to attack on 31 March.

On the other side of the hill, Lieutenant General Sir Philip Neame had just taken over the Cyrenaica command, which was a more amorphous entity than XIII Corps had been. The untrained 9th Australian Division had initially deployed its 20th Infantry Brigade forward, with two battalions near Mersa Brega; the rest of the division was still back near Tobruk. However, Wavell did not like an un-motorized unit, which had minimal anti-tank support, being left in such an exposed position and ordered Neame to pull the brigade back closer toward Benghazi.[27] Instead, Neame ordered Brigadier Henry B. Latham's Support Group from the 2nd Armoured Division to hold Mersa Brega and block the road to Benghazi. Neame's strongest unit – Rimington's 3rd Armoured Brigade – was scattered across the Agedabia sector and assigned a vague 'flank support role', but its three armoured regiments were in poor shape. The 600km road march from Tobruk to Agedabia had cost the 5 RTR one-quarter of its Mk IVA cruiser tanks and the remainder were in urgent need of depot-level maintenance. Both the 3rd Hussars and 6 RTR were equipped with captured Italian M13/40 tanks, which suffered from over-heating engines. The British had been able to create Field Supply Depots



The Italian B-2 anti-tank mine was simple but effective, particularly since the Western Desert Force did not have any electronic mine detectors in 1940. However, the Italians did not put much emphasis on mine warfare in the early stages of the campaign in North Africa. (Author's Collection)

(FSD) at Msus and Mechili, but the logistic situation in central Libya was still constrained, which undermined the ability to conduct mechanized operations. In late March, Wavell sent Neame a token reinforcement – the 3rd Indian Motor Brigade – although the brigade was lightly armed and would not arrive at the front until early April.

In the waning days of March, Wavell was warned by his director of military intelligence, Major General Eric J. Shearer, that the Germans now had an armoured brigade group in Libya, but it was assessed that the DAK would require at least two months to prepare for an offensive. Neame's Cyrenaica command expected that any enemy advance would focus on the Via Balbia corridor and would not attempt an outflanking manoeuvre through the desert unless the line of communications along the coast road was secured first; in other words, the enemy was expected to play it safe on logistics.[28] Unfortunately, military intelligence assessments can be seriously wrong when the enemy chooses a course of action which does not conform to accepted military logic.

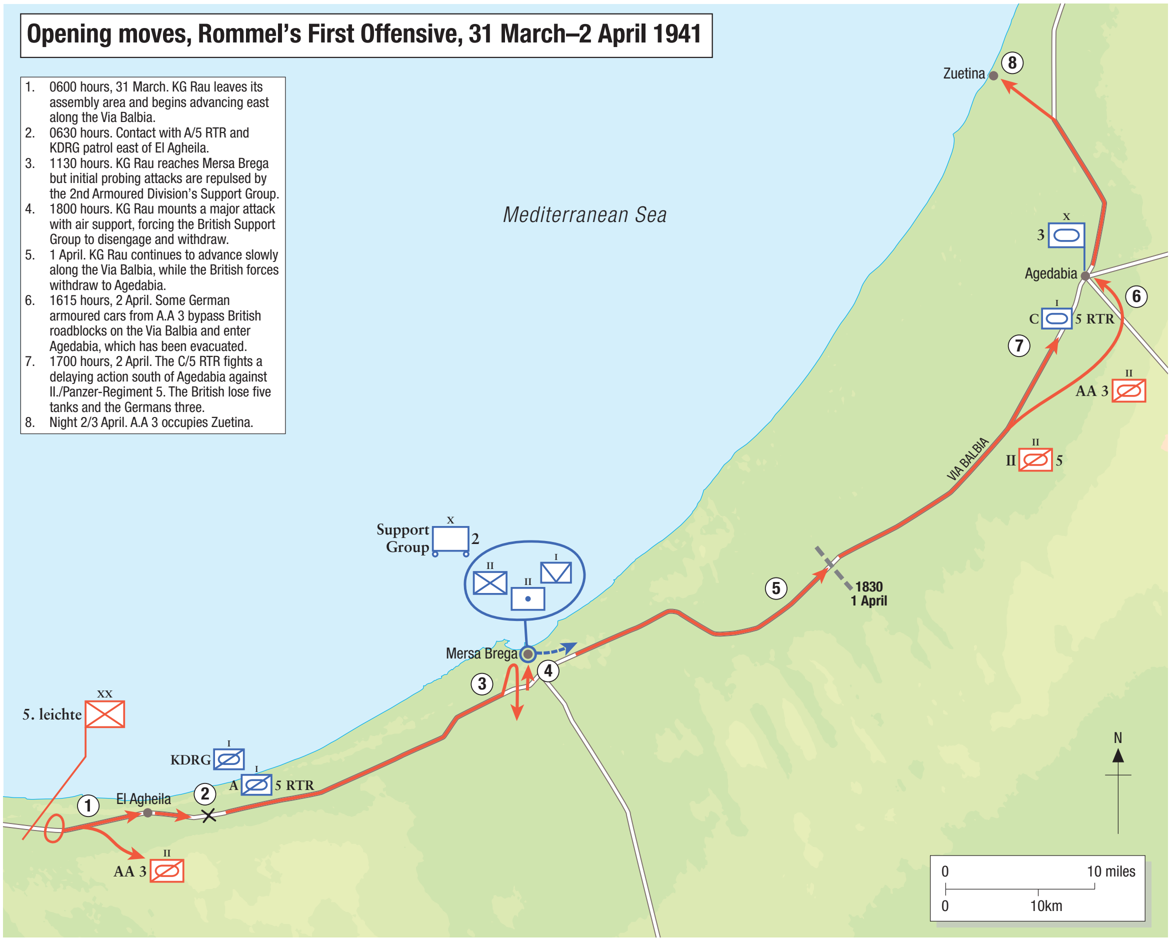
ROMMEL'S FIRST OFFENSIVE, MARCH–APRIL 1941

'German tankers in desert sand/racing to battle on English land/ rattling our tracks, revving our power/Panzers rolling to London's last hour.'[29]

Afrika Korps song, May 1941

Up to Beda Fomm, armoured operations in North Africa were predominantly a squadron commander's war, but as larger units came into play, it soon became a brigade commander's war. As a result of increased scale, command and control, as well as logistics, became more complicated – but not everyone noticed this shift at the same time.

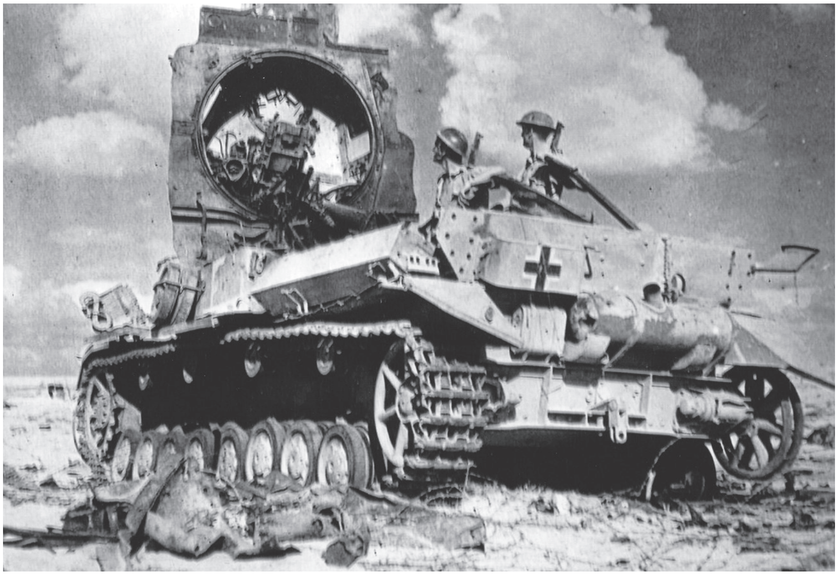
Rommel chose not to commit the entire 5.lei.Div. to the initial meeting engagements on 31 March. Instead, at 0600 hours Kampfgruppe Rau (II./Pz. Rgt. 5, Maschinengewehr-Bataillon 8 (M.G. Btl. 8), Pz.jg.-Abt. (Sfl) 605) began advancing along the coast road from El Agheila toward Mersa Brega while von Wechmar's A.A. 3 and M.G. Btl. 2 tried a flanking movement south of the road. Around 0630 hours, the lead German Pz III tanks from the 6. Kompanie encountered a patrol from the KDG and four cruiser tanks from 5 RTR, about 6 kilometres east of El Agheila.[30] A troop from A Squadron, 5 RTR under Major T. K. D. Pritchett occupied hull-down positions overlooking the Via Balbia and engaged the enemy column. Typically, the British tanks fired three rounds from a given hull-down position, then backed up, moved left or right, then occupied a new hull-down position and repeated the process; it is a tactic still in common use today. Both sides engaged in a long-range gunnery duel to no great effect: one British tank was damaged and one armoured car destroyed. The German tankers were not eager to close with



Opening moves, Rommel's First Offensive, 31 March–2 April 1941

1. 0600 hours, 31 March. KG Rau leaves its assembly area and begins advancing east along the Via Balbia.
2. 0630 hours. Contact with A/5 RTR and KDRG patrol east of El Agheila.
3. 1130 hours. KG Rau reaches Mersa Brega but initial probing attacks are repulsed by the 2nd Armoured Division's Support Group.
4. 1800 hours. KG Rau mounts a major attack with air support, forcing the British Support Group to disengage and withdraw.
5. 1 April. KG Rau continues to advance slowly along the Via Balbia, while the British forces withdraw to Agedabia.
6. 1615 hours, 2 April. Some German armoured cars from A.A 3 bypass British roadblocks on the Via Balbia and enter Agedabia, which has been evacuated.
7. 1700 hours, 2 April. The C/5 RTR fights a delaying action south of Agedabia against II./Panzer-Regiment 5. The British lose five tanks and the Germans three.
8. Night 2/3 April. A.A 3 occupies Zuetina.

the enemy but instead brought up an 8.8cm Flak gun to engage the British. At that point, Major Pritchett opted to break off and withdraw. The German response was surprisingly cautious, with scouts inching forward to try and find passable crossings through the salt marshes (*sabkha*) west and south-west of Mersa Brega. By 1130 hours, the German northern column had managed to cross the *sabkha* and began its assault on the British garrison at Mersa Brega, defended by Brigadier Latham's Support Group. However, Major Heinrich Voigtsberger's Maschinengewehr-Bataillon 2 (M.G. Btl. 2) was repulsed. Latham's artillery and anti-tank guns managed to keep the enemy at arm's length for seven hours, knocking out two German tanks, but the DAK called in two Stuka attacks, which softened the defence. Streich's 5. lei.Div. moved in cautiously and did not make a major effort until 1800 hours, which threatened to overrun some of the British positions. Latham ordered a counter-attack using his mechanized carrier platoon, which cost him eight carriers, but allowed the Support Group to disengage and withdraw. At 1900 hours, German tanks and armoured cars entered Mersa Brega.[31]



A Pz IV destroyed by 25-pdr fire during the failed breach attempt at Tobruk on 14 April 1941. The Afrika Korps lost 17 tanks in this short action, most of which could not be recovered. (Author's Collection)

Despite an appeal from Latham, Neame decided not to commit Rimington's 3rd Armoured Brigade against what was clearly a significant force of German AFVs at Mersa Brega. Instead, he ordered Gambier-Parry to pull his division back about 10 kilometres and conduct a delaying action. The next day, Streich's 5.lei.Div. cautiously pursued the British armour, but there were no engagements. On the morning of 2 April, Olbricht's Panzers continued to probe toward Agedabia and overran an infantry company from Latham's Support Group around 1030 hours, which hastily retreated north of the town. After this, Rommel ordered Streich to attack Agedabia at once, even though Gariboldi had told him to halt at Mersa Brega. Lieutenant Colonel Henry D. Drew's 5 RTR had left a rearguard along the road southwest of Agedabia, consisting of nine A-13s (Cruiser Mk IVA) from Major Hugh N. Winship's C Squadron. Major Winship, a very experienced tanker, had deployed his squadron in a rough line, occupying turret-down positions, in which the commander could observe to the front without exposing his tanks. He had also wisely ordered his tanks to place their turrets over the back decks, so they could use 'shoot and scoot' tactics. While Rimington's 3rd Armoured Brigade was slowly withdrawing north-east from Agedabia, Winship was expected to delay any sudden enemy advance. However, some of the armoured cars from von Wechmar's A.A. 3, which were moving south of the Via Balbia, were able to occupy Agedabia at 1615 hours.

Around 1700 hours on 2 April, Major Winship spotted a large group of enemy armoured vehicles advancing toward his position. It was Major Ewald Hohmann's II./Pz.Rgt. 5, advancing along the road in a *Breitkeil* (wedge shape) formation. Major Winship intended to wait until the enemy tanks were within effective 2-pdr range, but the British tanks were spotted and Major Hohmann's battalion opened the engagement at a range of about

A platoon (*Zug*) of Pz IV Ausf D tanks from 8./Pz. Regt. 5 in action near Mersa Brega on 31 March 1941. The Germans used their HE-firing 7.5cm Kw.K L/24 guns to suppress British anti-tank guns. (SDZ, 00089822)

1,000 metres. Either through luck or skill, the German tanks managed to knock out one of the British A-13 tanks in their initial volley. Winship returned the fire from hull-down positions, but the British tanks were out-numbered by more than 8-1. Even worse, Hohmann detached one of his companies to flank the British, which threatened to cut off Major Winship's squadron. After ten minutes of furious firing, which left three more A-13s burning, Winship decided to withdraw. However, while pulling out of his position, Major Winship's tank was struck by an armour-piercing round and burst into flames. The four remaining A-13s were able to escape, but the 5 RTR had lost 23 crewmen, including five officers, in this short action.[32] Major Hohmann's battalion had three tanks knocked out, with at least one Pz III *Totalausfälle* (total loss).[33]

Although Gambier-Parry was able to prevent Streich's 5.lei.Div. from destroying any major part of the 2nd Armoured Division, his division was simply too small to accomplish its mission. By the end of 2 April, Latham's Support Group was no longer capable of blocking the road to Benghazi against an attack led by tanks. Even a short retreat was also proving too stressful for Rimington's worn-out tanks; in just two days half his tanks had fallen out. On 2 April, the 3rd Hussars had to abandon five of their Mk VIb light tanks due to breakdowns and the 6 RTR's captured M13/40 tanks were dropping like flies. Alarmed by the sudden German offensive, Wavell flew forward to confer with Neame on the afternoon of 2 April and recommended withdrawing to the second escarpment, in front of Msus. Wavell also ordered O'Connor to return to Libya to lend some of his desert experience to Neame. On the other side of the hill, Streich's 5. leichte-Division had pushed back – but not destroyed – the British covering force. In order to obtain this limited tactical success, the 5. leichte-Division had consumed over 60 per cent of its on-hand fuel reserves and barely had enough left to reach Benghazi.

On the morning of 3 April, German reconnaissance confirmed that the British had pulled back some distance north of Agedabia and that the Via Balbia was relatively unguarded. The village of Zuetina was occupied and one patrol pushed as far as Magrun, which was found to be empty. With his remaining fuel dwindling, Rommel knew that he could not advance to Benghazi without resupply, so he made the decision to shift to a hasty defence with the 5. leichte-Division at Agedabia. He then ordered all available transport to retrieve additional fuel from the supply depots established west of El Agheila. Only von Wechmar's A.A. 3 (with one company of tanks attached from I./Pz. Rgt. 5, plus one platoon of Pz IV) was allowed to continue advancing in order to keep contact with the retreating 2nd Armoured Division and the Australian 20th Brigade. Gariboldi arrived at Rommel's command post and ordered him to halt his advance until additional reinforcements arrived. Rommel arrogantly ignored his nominal superior and demanded 'freedom of action'. He also received a direct order from the OKH not to advance past Agedabia or to be 'reckless' – which he also ignored.[34] It is important to note that the bulk of the forces involved in Rommel's offensive were Italian troops, not German (about 25,000 Italian and 9,000 German personnel).

Retreats often prove disastrous for formations with limited cohesion, and by the afternoon of 3 April, Neame had made the poor decision to split the 2nd Armoured Division. He assigned Latham's depleted Support Group to proceed to Sceleidima (70km south-east of Benghazi), then to Er Regima (20km east of Benghazi), while 3rd Armoured Brigade was ordered first to Msus then Charruba (100km east of Benghazi). Neame wanted the 2nd Armoured Division to protect the left flank of the Australian 9th Division, which was forced by the lack of motor transport to retreat in small bounds.[35] The withdrawal of the 2nd Armoured Division was hampered by poor radio communications – Rimington did not receive the order to fall back to Charubba for nearly 24 hours and then more of his tanks had to be abandoned due to mechanical faults and lack of fuel.[36] During the withdrawal, the 6 RTR's M13/40 tanks caused a flap when they were reported as an 'enemy column', and elements of the arriving 3rd Indian Motor Brigade were also mistaken for Italians. By the evening of 3 April, Neame peremptorily ordered a general withdrawal to the line of Derna–Mechili, abandoning the second escarpment, even though his forces were not engaged closely by the enemy. The Australians then hastily abandoned Benghazi, which enabled the vanguard of von Wechmar's A.A. 3 to enter the city during the night of 3/4 April.

The easy capture of Benghazi, combined with Luftwaffe aerial reconnaissance, clearly indicated that the British were in retreat. Rommel was eager to strike while the enemy was still disorganized, even though his own supply situation was awful. Arriving in Benghazi on the morning of 4 April, Rommel ordered von Wechmar's A.A. 3 to pursue the Australians withdrawing through the Jebel Akhdar mountains. Although Rommel was not a cavalryman – a breed known to be intoxicated by the thought of wide envelopments – he was attracted to the idea of sending another column across the desert to try and cut off the British retreat before they reached the relative safety of Tobruk. The Italians reminded Rommel that the desert tracks were littered with unexploded AR-4 mines, which he ignored. Rommel ordered Oberstleutnant Gerhard Graf von Schwerin to lead a mixed motorized column from Agedabia and move along the Trigh el Abd camel track toward Ben Gania and Mechili. Rommel glibly said the final objective of Gruppe Schwerin would be Tmimi, located over 300 kilometres away. Von Schwerin was given a few companies of German motorized troops and the Italian colononna Santamaria (described as a reconnaissance battalion), but he had little fuel and no maps. Nevertheless, like a good soldier, von Schwerin promptly moved out with his column. The Trigh el Abd turned out to be a wretched track through a waterless wasteland and several German vehicles discovered AR-4 mines the hard way. By nightfall on 4 April, von Schwerin had moved over 100 kilometres, but his vehicles had all run out of fuel.

After dispatching von Schwerin's column, Rommel ordered Streich to form a larger column (with I./Pz.Regt. 5, M.G. Btl. 8, and company-size detachments of Panzerjäger and Pionier) and follow the Trigh el Abd as well. Oberstleutnant Gustav Ponath, commander of M.G. Btl. 8, recorded the tribulations of trying to move a column along a desert track in the darkness in his diary. On the first night, he wrote that 'in the darkness, tanks ran over nine motorcyclists. We lose our way'. During the night, the column drove off the track and got lost, forcing a halt, around 0200 hours. At dawn, scouts were sent out to find the track, then the march resumed on the morning of 5 April. Ponath noted that vehicles kept falling out or getting lost.[37]

In fact, not all the Allied units were retreating. O'Connor arrived at Gambier-Parry's headquarters at El Abiar (46km east of Benghazi) and ordered the Australians to conduct a rearguard action at Er Regima to delay the enemy advance. The rocky, hilly terrain around Er Regima favoured defence and the enemy would be forced to move through a narrow defile, which was mined. O'Connor was annoyed that Gambier-Parry could not locate his 'missing' 3rd Armoured Brigade and that British recon units were not in contact with the enemy, but took no corrective action.[38] Von Wechmar's A.A. 3 advanced east from Benghazi, occupied the Benina airfield and encountered the British obstacle in the late afternoon. One Panzer-Kompanie supported the advance and deployed its tanks on line, but was quickly stopped by the mines and the restrictive terrain. The Australian 2/13 Battalion defending the escarpment around the pass was supported by a regiment of 25-pdrs, but their only organic anti-tank weapons were a few 14mm Boys anti-tank rifles. Amazingly, the Australians and attached artillery managed to disable 4–5 German tanks and then disengage after nightfall, having suffered a total of 104 casualties.[39]

Despite his poor fuel situation, Rommel decided to shift to the pursuit on 5 April. Without paying much attention to the terrain (of which he was ignorant), Rommel ordered Olbricht to take the II./Pz. Regt. 5 and M.G. Btl. 2 and advance from Agedabia to Antelat, then to Msus. Von Wechmar with A.A. 3 was to advance to Charruba. The motorized elements of the Italian 'Brescia' division – the equivalent of about two battalions – were to advance through the Jebel Akhdar mountains toward Derna. The OKH had sent General Major Heinrich Kircheim to join Rommel's staff as an advisor, since he was one of the few German officers with extensive experience in Africa. Kircheim had served for ten years as a colonial officer in South West Africa prior to the First World War and the OKH thought he might be useful in Libya. Rommel did not want advisors and instead put Kircheim in charge of the 'Brescia' forward detachment and told him to go and take Derna.[40] Rommel's willingness to split the 5. leichte-Division into multiple, non-supporting columns was in direct contravention of German manoeuvre doctrine. Once broken up, a Panzer division was not easy to re-assemble and lost much of its combat capability. It is important to note that Axis intelligence on Allied reserves in North Africa at this point was negligible and Rommel did not know the status or location of the 7th Armoured Division. By splitting his single small mechanized division in a situation where enemy reserves were unknown, Rommel put his forces at risk of being defeated in detail. Rommel also began demonstrating his 'lead from the front' methods by joining Oberstleutnant Gustav Ponath's M.G. Btl. 8, which was still struggling along the Trigh el Abd behind Gruppe Schwerin. Rather than staying with his forward command post and controlling the DAK as whole, Rommel reduced his situational awareness to a tactical level. Furthermore, Rommel was frequently out of radio contact when at the front, and his staff were left guessing about his intentions.

Rommel moved with Ponath's column all night, bullying and cajoling officers and men to keep moving. The German column suffered more losses from Italian AR-4 mines, as well as mechanical failure and fuel exhaustion. Nevertheless, at dawn on 6 April, Ponath's vanguard was still 25 kilometres south of Mechili. A Luftwaffe Hs-126B reconnaissance plane reported that Mechili was occupied by a large enemy force – which was Brigadier Edward W. D. Vaughan's 3rd Indian Motor Brigade. The Indian brigade was equipped mostly with just small arms and had only three Boys anti-tank rifles for defence against tanks.[41] Gambier-Parry's 2nd Armoured Division headquarters was also in Mechili, where the RASC had stockpiled a plentiful supply of fuel, ammunition and water in FSD 20. Rommel conferred with Streich and Ponath and ordered them to attack Mechili by 1500 hours, even though this was patently absurd. Streich outright refused because his division was strung out all over the desert and in no condition to attack. Rommel allegedly called Streich a coward, and there is no doubt that their relationship deteriorated during the advance to Mechili.[42] Rommel was also angry with Olbrich due to the slow advance of his Panzers. Although modern writers like to extoll the virtues of German *Auftragstaktik* or mission orders (which was not part of official German doctrine in 1941), these methods clearly did not work for Rommel at Mechili in April 1941. Issuing mission orders without concurrent logistic planning to support the scheme of manoeuvre is a recipe for failure.

Having spent the night bumping along a rocky desert track in a staff car, Rommel was unaware that lack of fuel had brought the DAK to its knees by the morning of 6 April. Olbrich's column was immobilized near Msus and he requested 50,000 litres of fuel in order to continue. Streich's column was strung out between Ben Gania and Tengeder and partly immobilized.[43] Rommel airily suggested to Olbrich and Streich that they should siphon fuel from trucks to keep their tanks moving.[44] One thing is for sure – Rommel never had to siphon gas to keep his vehicle moving. Decades ago, I siphoned fuel with my tank platoon to keep a few vehicles moving when our fuel resupply failed during a severe winter storm, and can personally attest that it is a miserable experience for tankers. After 30 minutes effort, we had barely transferred a few gallons and half my platoon was vomiting from ingesting diesel fuel. As a sop to his commander's urgent requests for fuel, Rommel managed to get the Luftwaffe to send five Ju-52 transports to deliver fuel to an assembly area south-west of Mechili, but this was a drop in the bucket.[45]

Axis communications were also breaking down, with the DAK spread out beyond normal radio range. While a few German and Italian light units reached Mechili later in the day (the 'Ariete' Division had formed two motorized columns from Colonnello Ugo Montemurro's 8° Reggimento Bersaglieri), Rommel was unable to mount an attack.[46] Frustrated by these developments, Rommel ordered Ponath to continue on toward Derna to cut off the Allied retreat to Tobruk. During the night of 6/7 April, Ponath's column encountered a number of British vehicles moving eastward. O'Connor and Neame, who had left Maraua and were en route to Tmimi, bumped into Ponath's motorcyclists and were captured. Lieutenant Colonel John Combe of the 11th Hussars was also captured by Ponath. These senior prisoners were soon handed over to the Italians, who no doubt were very pleased to meet O'Connor and Combe.

Inside Mechili, Gambier-Parry ordered the rest of his division to proceed to Mechili, but the poor state of British communications made this problematic. Instead, both Rimington's armour brigade – reduced to just 24 tanks – and Latham's Support Group were already making their way to Derna by way of Maraua. En route to the refuelling point in Maraua, the 5 RTR lost one of its few remaining Mk IVA cruiser tanks to another pesky Italian AR-4 mine.[47] While Rommel and the British commanders were fixating on Mechili, the Italian X Corps (parts of the 'Brescia' and 'Bologna' divisions) was actually making good progress along the Via Balbia, despite the fact that they only had one company of tanks and some armoured cars in support. After the brief stand at Er Regima, the two Australian brigades from the 9th Division made little effort to delay the Italians and retreated rapidly toward Derna. Although the Australian 20th Brigade ordered road demolitions to delay the Italian advance, Lieutenant Colonel Robert F. Marlan's 2/15th Battalion failed to execute the order. Marlan paid for this omission when he and over 180 of his men were scooped up by a fast-moving enemy column near Giovanni Berti on the morning of 7 April.[48] Meanwhile, the 'Ariete' Division, reinforced with a battalion of M13/40 tanks, followed Gruppe Olbrich but ran out of fuel near Ben Gania.

By the morning of 7 April, it was clear that Streich's 5. leichte-Division was in no position to mount an assault on Mechili and Rommel had to content himself with desultory shelling from a distance with a few field guns. Even though Gambier-Parry's forces in Mechili were not fully surrounded yet, Rommel tried to bluff the British garrison to surrender – which was rejected. Gambier-Parry should have evacuated Mechili before the German main body arrived, since he had very little artillery or anti-tank weapons, but he was reluctant to abandon the supply dumps. He also believed that his division was en route to reinforce him at Mechili, which was not correct. Instead, Rimington's 3rd Armoured Brigade was conducting a delaying action back to Derna. Along the way, Rimington's own command tank went off the road and he was seriously injured; somehow the rest of the column did not notice it had lost its commander. Rimington was subsequently captured by the Italians, but died two days later from his injuries. En route to Derna, the 3rd Hussars lost the last of its Mk IVb light tanks and all the captured M13/40 tanks had been destroyed after they ran out of fuel. Lieutenant Colonel Henry Drew took command of the rump brigade, reduced to just seven Mk IVA cruiser tanks from 5 RTR, which reached Derna around 1200 hours on 7 April. Unknown to Drew, the lead elements of Ponath's M.G. Btl. 8 reached the airfield near Martuba, about 25 kilometres south-east of Derna, around 1130 hours. After taking the airfield, Ponath established a blocking position along the Via Balbia with machine-guns and a few 3.7-cm anti-tank guns. A few armoured cars from A.A. 3 also arrived at the airfield. Australian convoys moving along the Via Balbia back to Tmimi soon spotted Ponath's roadblock and reported that enemy forces were already east of Derna.

Lieutenant Colonel Drew learned about the enemy force blocking his line of retreat and conducted a personal reconnaissance with a troop of four tanks to verify the information. Satisfied that the enemy was indeed there, he returned to Derna to gather his remaining tanks and part of the Support Group and then mount a co-ordinated breakout effort. However, Drew's simple tactical plan was upset when some Australian sappers decided to prematurely detonate a large explosive charge to block the road up the escarpment before the last three tanks had left Derna. These three tanks no longer had a means of escape, due to the steep escarpment and cratered road, so they were abandoned. Drew still managed to mount a mini combined-arms attack against Ponath's roadblock, with his four tanks, some 25-pdr support and about 100 infantry from the Tower Hamlets. According to Liddell Hart's post-war history, the German 3.7cm Pak guns knocked out all four cruiser tanks but were themselves overrun by the desperate British breakout attempt, which succeeded.[49] According to Trooper Jake Wardrop, a tank driver from 5 RTR actually involved in the action, the German anti-tank guns only knocked out one British tank, but two more dropped out from mechanical problems en route back to Tobruk. Most of the survivors of 3rd Armoured

Brigade and Support Group did escape, but only one of 5 RTR's cruisers reached Tobruk (carrying four crews).[50] Despite this exciting escape, by 2200 hours on 7 April it was clear that no relief force was going to Mechili and Brigadier John Harding, filling in for the missing Neame, ordered Gambier-Parry to evacuate Mechili at once.

However, Gambier-Parry dallied for the next eight hours, discussing the situation with Brigadier Vaughan and then opting for the most predictable scheme of manoeuvre – a breakout due eastward, to start at dawn. Gambier-Parry only had a single cruiser tank from the division headquarters to lead the attack, while the rest of the troops would be mounted in thin-skin motor vehicles. Unfortunately, during the night German and Italian reinforcements finally reached Mechili and tightened the ring around the garrison. The motorized Fabris column (III Battaglione Bersaglieri) under Tenente Colonnello Gino Fabris was blocking the British escape route to the east.[51] Major Ernst Bolbrinker personally led eight tanks from his I./Pz.Regt. 5 and reached the outskirts of Mechili before the breakout began. Bolbrinker was a tough Austrian Nazi, who had been a stormtrooper in the First World War and a Freikorps member afterwards. Transferring to the Wehrmacht in 1936, Bolbrinker had five years of experience in the Panzerwaffe and was a hard-nosed combat veteran. The British breakout attempt miscarried from the start and did not actually begin until 0630 hours on 8 April, with the sun already up. The single cruiser tank attacked and helped some vehicles to escape through the enemy perimeter before it was destroyed. Then Bolbrinker's tanks arrived and proceeded to engage the massed British column, inflicting considerable damage. A battery of Australian anti-tank guns, equipped with 37mm Bofors guns, tried to engage Bolbrinker's tanks but failed to stop the attack. Eventually, Gambier-Parry surrendered with most of his 2nd Armoured Division headquarters and Vaughan surrendered with about two-thirds of his brigade; altogether, the Germans took about 1,800 prisoners at Mechili.[52] A few hundred survivors succeeded in reaching Tobruk, but the Germans captured the supply dump intact.

The 'Brescia' Division took Derna on the same day that Mechili fell and Ponath's Kampfgruppe advanced to the outskirts of Tmimi. However, the Australian 20th Brigade escaped into Tobruk to join the rest of Major General Leslie Morshead's 9th Australian Division. The belated victory at Mechili was Rommel's only real tactical success in his offensive so far and without the port of Tobruk, it would be a hollow triumph. Late in the afternoon of 8 April, Rommel arrived at the Derna airfield and met with Ponath and Kircheim, who had been leading the 'Brescia' vanguard. Towards evening, Generalmajor Heinrich von Prittwitz, commander of 15. Panzer-Division, also turned up at Derna. Although 15. Panzer-Division was just beginning to arrive in Tripoli, von Prittwitz brought a small staff with him to the front to get oriented to the theatre. In another snap decision, Rommel ordered von Prittwitz to go and take Tobruk with A.A. 3, Ponath's battalion, an artillery unit and some Panzerjägers; this was ludicrous, but von Prittwitz obeyed and headed off to find the front. Von Prittwitz was one of Germany's most professional Panzer officers, General Staff-trained, with six years of armour experience, and he had been with Guderian at Sedan in 1940. Now he was told to attack a fortress with a couple of battalions, as if it were some French village.

Although the British command structure was jolted by the loss of O'Connor, Neame and Gambier-Parry, Wavell flew to Tobruk and instructed Morshead to hold the position for eight weeks, while a relief force was assembled in Egypt. In addition to the eight infantry battalions in his own division, Morshead was given the 18th Brigade from the Australian 7th Infantry Division with three more infantry battalions. In addition, Morshead was provided five regiments of British field artillery and Lieutenant Colonel Drew formed a composite armour unit based on the 1 RTR with seven Mk IVA cruisers and 15 Mk VIb light tanks. Over 40 tanks had been left in Tobruk for repairs and two more cruisers and 16 light tanks were made operational prior to the German attack.[53] In addition, a detachment of four Matilda II infantry tanks from the 4 RTR arrived in Tobruk by sea on 8 April. Although Morshead was forced to defend a large perimeter (44 kilometres in length), the forces he had in hand amounted to a reinforced division. Furthermore, Morshead's supply situation was much better than Rommel's, who was still dependent upon Tripoli. The British also deployed a small mobile force under Brigadier Gott, from remnants of the 2nd Armoured Division's Support Group (Brigadier Latham had been relieved of command), reinforced by two squadrons of the 11th Hussars and one squadron of the 7th Hussars (with 17Mk VIb light tanks) to block the coast road along the Egyptian–Libyan border near the Halfaya Pass.[54]

On 9 April, von Prittwitz and Kircheim tried to push their small motorized *Kampfgruppen* from Derna toward Tobruk, which was over 100 kilometres distant. By the end of the day, armoured cars from von Wechmar's A.A. 3 had reached Acroma and were engaged by Tobruk's outer perimeter. Meanwhile, the bulk of Streich's 5. leichte-Division was still stumbling into Mechili and Olbrich's Panzer Werkstatt mechanics were trying to fix as many immobilized tanks as possible to restore Pz.Regt. 5's combat capability. Rommel's decision to commit his armour across the desert led to roughly 85 per cent mechanical casualties, leaving only 25 operational tanks to reach Mechili. In contrast, Olbrich's Pz.Regt. 5 had only lost about ten tanks to enemy action. Repairing these tanks in the desert far from their supply base was going to take time, but Rommel would not hear of it. Instead, he ordered Olbrich to move as many Panzers forward as possible to support von Prittwitz. The Italian 'Ariete' division was in a similar state of discomfiture, with less than 20 per cent of its tanks and vehicles still combat ready. Although some of Rommel's subordinates disputed the wisdom of his decisions, they obeyed and tried to carry out his plan to assault Tobruk as soon as possible.

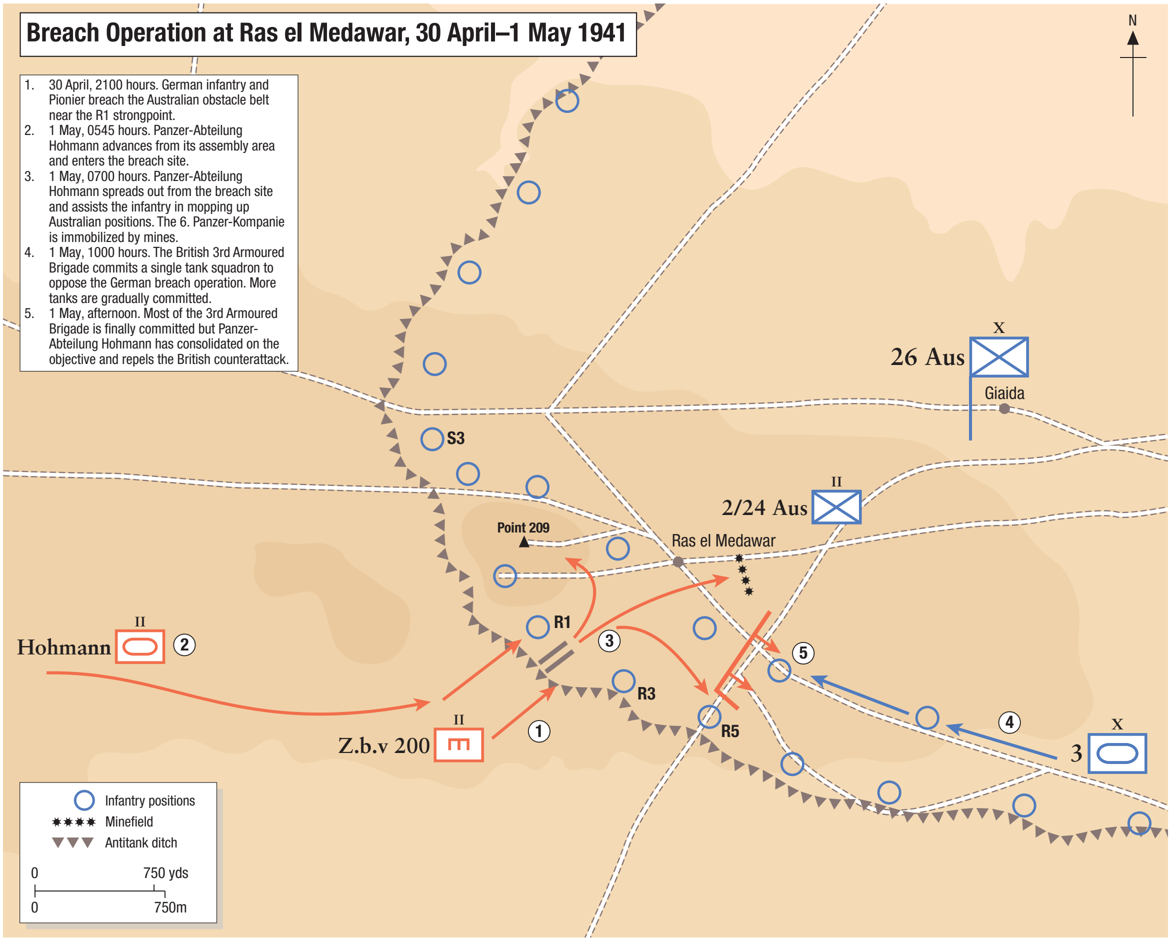
On the morning of 10 April, Rommel allegedly told his staff that 'our objective is the Suez canal'. He then drove forward to meet von Prittwitz and ordered him to launch a hasty attack with whatever units were at hand, which was not much. Rommel made the assumption that the British were on the verge of evacuating Tobruk and did not expect a resolute defence – although he had no hard intelligence to support this conclusion. Gruppe Prittwitz had no maps of Tobruk, no intelligence on enemy dispositions and only a few batteries of Italian 75/27 guns in support. Around 0900 hours, Ponath led a column (seven armoured cars and two companies from M.G. Btl. 8) forward toward the western side of Tobruk's perimeter and bumped into armoured cars from the KDG. British artillery began pounding the German column, inflicting numerous casualties. Von Prittwitz drove forward in his staff car, unaware that he was within range of enemy direct fire weapons, and he was killed when his vehicle received a direct hit.[55] The British also had air superiority over the Tobruk sector, and Hurricane fighters from No. 73 Squadron conducted multiple low-level strafing attacks, shooting up German motorized columns approaching Tobruk. General Major Kircheim was caught in one of these attacks and badly wounded. After several hours of fruitless skirmishing, Ponath broke off his probing attacks. Rommel's ill-considered order to attack Tobruk with inadequate forces and no prior reconnaissance resulted in the loss of two senior German leaders for absolutely no gain. By any standards of professional military leadership, Rommel's decision-making between 6–10 April was not just excessively reckless, but patently idiotic. However, the 'Rommel myth' created by his opponents and post-war historians (including Liddell Hart) has helped to conceal his amateurish inability to effectively use the tools of armoured warfare in the North African desert.

Even good commanders can make tactical mistakes, but the truly bad ones double down on their mistakes and continue to make them over and over again – which is what Rommel decided to do at Tobruk. Rather than re-organizing for a proper siege and assault, Rommel continued to order hasty, poorly planned attacks on Tobruk's outer perimeter in the vain hope that the defence would collapse. He also refused to consider logistic constraints or the need for armoured units to conduct proper maintenance in order to be combat-ready. A true armour leader incorporates logistics and maintenance into the fabric of any manoeuvre plan, instead of wishing them away because they are inconvenient.

Despite the failure of Ponath's probe on 10 April, Rommel ordered Streich to bring up all his available tanks to support a more serious attack against Tobruk's southern perimeter on 11 April. He told Olbrich that the enemy would withdraw as soon as they saw German tanks approaching. Olbrich was only able to send about 20–25 tanks from II./Pz. Regt. 5 to support Ponath's M.G. Btl. 8 and they did not reach Tobruk until 1500 hours. A few Italian tanks and tankettes from the 'Ariete' Division were also available, along with some artillery from the 'Brescia' Division. Without any real reconnaissance, Rommel chose to conduct the breakthrough attempt 3 kilometres west of the El Adem road, but was unaware of the existence of the Italian-built anti-tank ditch in this sector, which was 4–5 metres in width and 4 metres deep. Two Australian platoon-size entrenched positions, R33 and R35, overlooked the sector the Germans chose to attack. The German attack started late, around 1600 hours, and the tanks and infantry came under artillery fire even before they left their assembly area. A sandstorm further impeded the attack and made it impossible to co-ordinate with the Italian artillery to suppress the enemy defences. The British artillery fire intensified as the German tanks approached the perimeter, forcing tank crews to button up, which greatly reduced their situational awareness. Unexpectedly, the German tanks encountered the anti-tank ditch, which prevented any further advance. Stymied by the anti-tank ditch, the German panzers fired at the British positions for a while (which had no anti-tank guns), then turned east and tried to find a bypass, but there was none.[56] Moving laterally across the front of an alert enemy is another major sin for tankers because it exposes them to flanking fire on their thinner side armour. Around 1830 hours, a squadron of tanks from 1 RTR arrived, summoned by the Australians, and began engaging the German armour. Two cruiser tanks were destroyed, but one German tank and one Italian M13/40 were knocked out, causing Streich to break off the action.[57] Ponath's infantry was left in an exposed position under fire for the remainder of the day. The German armoured attack on 11 April failed because of lack of reconnaissance to identify the enemy obstacle belt, as well as lack of engineer and artillery support to conduct a breach operation.

By the end of 11 April, the 34,000-man garrison of Tobruk (with 12 infantry and 1 tank battalions) was under loose siege by the Italian 'Brescia' Division (about two infantry battalions) in the west, the 5.lei.Div. in the south (with one infantry and two Panzer battalions) and Gruppe Schwerin (M.G. Btl. 2) in the east. Rommel had a few other odd detachments about, but he was oblivious to the fact that he was taking on an entrenched force that out-numbered the besiegers by more than 3-1. Rommel's stubborn refusal to see the actual battlefield situation was likely due to the ideas he retained from the French campaign and reinforced by the rapid withdrawal of the 2nd Armoured Division – that the enemy wanted to flee, rather than fight. He was about to get an education.

Rommel ordered Streich to try again on 12 April, this time with one Pionier platoon attached. Olbrich's Panzers and Ponath's infantrymen reached the anti-tank ditch at 1645 hours, but the Pionier platoon did not show up, so the breach attempt was aborted. The RAF did show up and Blenheims bombed Olbrich's Panzers, further adding to their discomfiture. Clearly for something as important as a battalion-size breach operation, some kind of rehearsal is necessary in order to enhance combined arms coordination, but Rommel was in too much of a hurry to allow such luxuries. Ponath was disgusted with the attempt, first by Olbrich's Panzers nearly running over his prone infantry, then being ordered to dig in 200 metres from the Australian positions. Caught on the open sand, 's infantry suffered heavy casualties from the British artillery fire. A sandstorm descended over the battlefield, further isolating Ponath's battalion.[58] Frustrated by his vulnerable situation, Ponath waited until night fell on 13 April then moved forward, with some *Pioniertruppen* who belatedly showed up, to breach



Breach Operation at Ras el Medawar, 30 April–1 May 1941

1. 30 April, 2100 hours. German infantry and Pionier breach the Australian obstacle belt near the R1 strongpoint.
2. 1 May, 0545 hours. Panzer-Abteilung Hohmann advances from its assembly area and enters the breach site.
3. 1 May, 0700 hours. Panzer-Abteilung Hohmann spreads out from the breach site and assists the infantry in mopping up Australian positions. The 6. Panzer-Kompanie is immobilized by mines.
4. 1 May, 1000 hours. The British 3rd Armoured Brigade commits a single tank squadron to oppose the German breach operation. More tanks are gradually committed.
5. 1 May, afternoon. Most of the 3rd Armoured Brigade is finally committed but Panzer-Abteilung Hohmann has consolidated on the objective and repels the British counterattack.

the anti-tank ditch. Although the Australian infantry mounted spirited counter-attacks to disrupt Ponath's breach attempt, by 0230 hours on 14 April the Germans had created a rudimentary crossing over the anti-tank ditch near the R33 position and removed the anti-tank mines. Ponath established his command post in the anti-tank ditch and quickly sent two infantry platoons to secure the far side of the obstacle. He also notified Olbrich's Panzers of the breach. Amazingly, an Australian platoon in R33 was still in place, overlooking the breach site 300 metres away.

One hour before dawn, the II./Pz.Regt. 5 began crossing the breached anti-tank ditch, which was not well marked. The first German Panzer company, with each tank carrying a few of Ponath's infantrymen, advanced past the Australian-held positions without making any effort to eliminate them. Almost immediately, the German tanks were engaged by two batteries of 25-pdrs (1 RHA), which quickly separated Ponath's infantry from the tanks. The Australian infantry from the 2/17th Battalion, defending this sector, also poured a continuous fire into the German armoured group. Nevertheless, Olbrich's

Panzers continued pressing towards the north-east and a second group of tanks crossed the anti-tank ditch, as well. Under heavy fire, the German tanks tried to use bounding overwatch tactics, with one platoon moving while another fired to suppress enemy positions. As a result, the German tanks were able to advance roughly 5 kilometres into the depth of the Australian position and get within 600 metres of the British artillery batteries. The British 25-pdr crews fired in direct lay at the on-coming enemy armour and blew the turret off one Pz IV tank with a direct hit. Four other Panzers were also disabled by artillery fire. The British gunners suffered heavily during the duel, with one 25-pdr destroyed and ten personnel killed.[59] Australian anti-tank gunners, with 2-pdrs mounted on portee, also engaged the German armour, knocking out several, but two portees were destroyed. Hard-pressed, the Australian 20th Brigade appealed for armoured support and a squadron of tanks from the 1 RTR appeared from the north-east at dawn. The British tanks counter-attacked into the German right flank, inflicting further losses. Under fire from all directions, Olbrich decided to break off the attack at 0730 hours and fall back to the breach site. The Australians and British poured intense fire on the breach site, kicking up dust and creating total chaos at this point. Although Leutnant Schorm managed to find the breach and reach friendly lines, nearly half the German tanks were lost in the failed assault. For some reason, Ponath thought that he could maintain a foothold in the Australian defensive line to facilitate another attack, which caused him to order his surviving troops to remain north of the anti-tank ditch. Once the German tanks were gone, the British tanks and Australian infantry began mopping up Ponath's isolated battalion. Two Matilda II tanks arrived for the *coup de grâce*, which resulted in Ponath's death and the surrender of his remaining troops by about 1000 hours.

Of 38 tanks involved in the 14 April assault, 17 were lost, including 5 Pz IVs. The British managed to capture a number of tanks intact, including the latest Pz III Ausf H model (which was evacuated by sea for later technical analysis in England).[60] Ponath's M.G. Btl. 8 was decimated in the assault and altogether the Germans lost at least 150 killed and 250 captured. Allied losses were modest, including 2 cruisers and 1 light tank lost by the 1 RTR, while personnel losses were 26 killed and 64 wounded. Rommel, who watched the assault, immediately blamed Streich for the failure of the Easter attack, claiming that Olbrich had abandoned Ponath's infantry and that 'the division's command had not mastered the art of concentrating its strength at one point, forcing a breakthrough.[61]

Even after this tactical disaster, which reduced his available armour to a very low ebb, Rommel refused to adopt siege tactics. Yet since he was running out of German troops, he simply substituted Italian troops. On 15 April, he ordered the 'Ariete' Division and the new 102ª Divisione Fanteria 'Trento' to conduct an attack on the west side of the Tobruk perimeter, near Ras el Medawar.[62] The 'Trento' was one of Italy's only two fully motorized infantry divisions and intended to work with 'Ariete' as a combined arms team. If employed properly as a full-strength mobile corps, these two divisions were capable of achieving significant results on the battlefield. Most of the VII Btgl. Carri M. M13/40 tanks had fallen out in the advance across the desert and only 12 of 46 reached Tobruk by the end of April. Nevertheless, Rommel ordered the Italian motorized units into battle piecemeal on 15–16 April, with just a couple of infantry battalions and minimal tank support (seven M13/40s and 12 CV-35s) and they suffered over 1,300 casualties.[63] The 'Trento' Division lost the equivalent of two infantry battalions. The British even took the opportunity to mount a counter-attack with three cruiser tanks and five Bren carriers against the Italians near Ras el Medawar on 22 April, which overran the Fabris detachment (III Battaglione Bersaglieri); Tenente Colonnello Fabris was killed in action and 368 of his men captured.[64]

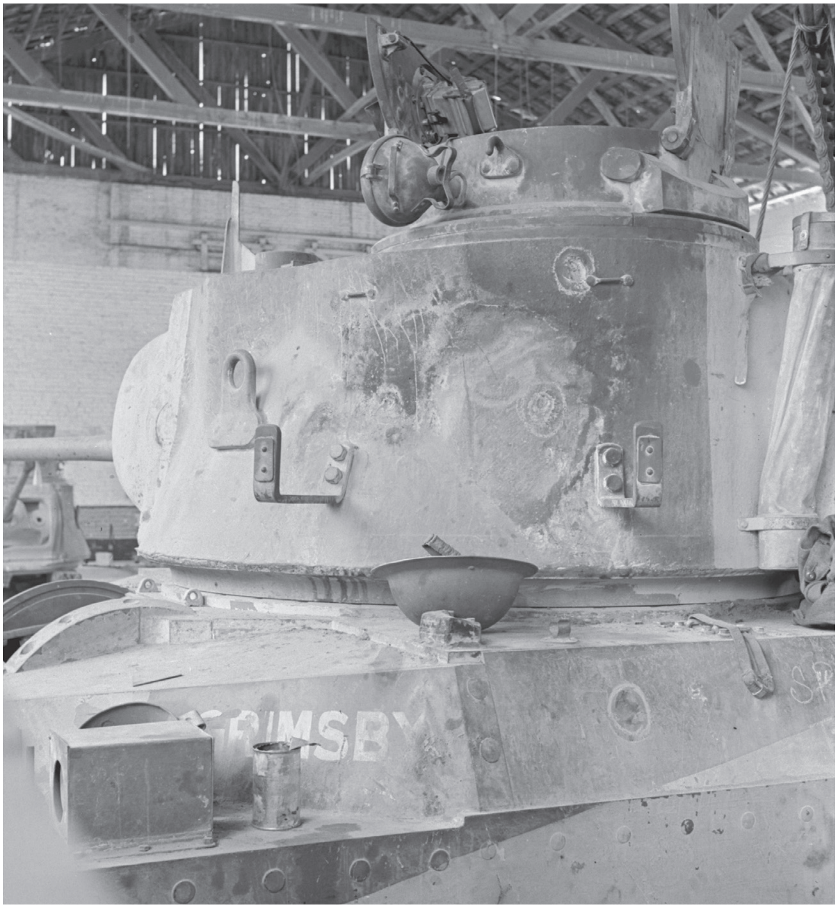
While launching the fruitless attacks against the Tobruk perimeter, Rommel had simultaneously begun pushing eastward toward the Libyan–Egypt border and spoke of 'unique opportunities', by which he was alluding to the Suez Canal. Von Wechmar's A.A. 3 had occupied Bardia without a fight on 12 April. Gott's mobile force could not even stand up against this small force and was forced to retreat to Sollum, while a company of Free French infantry was assigned to guard the Halfaya Pass. In order to further strengthen his forces near the border, Rommel decided to form Vorausabteilung Knabe (Oberstleutnant Gustav-George Knabe) from the lead elements of 15. Panzer-Division, comprised of the Kradschützen-Bataillon 15 (Motor Infantry Battalion), Pz.jg.-Abt. 33 and one battery of 8.8cm Flak guns. Knabe's detachment occupied Sollum on 13 April, forcing Gott to pull back into Egypt. When Oberst Maximilian von Herff arrived to take temporary command of the vanguard of the 15. Panzer-Division arriving near Tobruk, Rommel instead ordered him to head to Sollum and to form a new *Kampfgruppe* incorporating both A.A. 3 and Gruppe Knabe. Several Italian units were also sent to reinforce Kampfgruppe von Herff (two infantry and one artillery battalions), further weakening the Italian forces at Tobruk.

Back near Tobruk, Rommel still did not accept the need to employ siege tactics to reduce the fortress and kept pestering the OKH with requests for more reinforcements. Both German and Italian reinforcements were arriving from Tripoli, but at a rate which would not permit another major assault until the end of April. The 15. Panzer-Division was a far more powerful formation than the 5.lei.Div., but due to British attacks on the Italian convoys to Tripoli its entry into theatre was drawn out. Although the German press was exultant about Rommel's success in Libya, Generaloberst Halder and the OKH staff were not pleased with reports from the North African front. After hearing about the failed Easter assault, Halder wrote that 'Rommel is in no way up to his operational task. All day long he rushes about between the widely scattered units, and stages reconnaissance raids in which he fritters away his forces…The piecemeal thrusts of weak armoured forces have been costly'. Halder also described Rommel as 'this soldier gone stark mad' and resolved to reign him in.[65] He decided to send Generalleutnant Friederich Paulus, who served on the OKH staff as the senior quartermaster, to Rommel's headquarters and evaluate the situation.

Rommel's conquest of much of Libya in just two weeks in April 1941 is typically depicted as a mechanized tour de force, but the operation was amateurishly planned, badly executed and achieved very limited results beyond embarrassment to the British. Rommel blatantly disregarded his orders and pushed his limited forces beyond practical support range and continued to announce boastful objectives, like the Suez Canal, that were incongruent with German strategic objectives. At the operational level, Rommel's disregard for logistics crippled Streich's 5.lei.Div. and his disregard for intelligence cost the DAK the services of three valuable senior officers in his ill-judged hasty attacks on the Tobruk perimeter. While German Panzers had suffered some tactical setbacks in earlier actions in Poland and France, Rommel had the dubious distinction of being the first commander to cripple his own armoured force; in just two weeks, Olbrich's Pz.Regt. 5 was reduced from 150 operational tanks to just 20. While 4. Panzer-Division had suffered a costly repulse at Warsaw in 1939, the Germans were still able to accomplish their operational objectives of surrounding the city and eventually forcing the garrison to capitulate.[66]

Rommel equated tanks with manoeuvre and firepower, but in crude terms. The wide encirclement through the desert was conceived in the abstract, without reference to terrain or the environment. Good manoeuvre commanders have an instinctive grasp of time-distance factors (i.e. how long it will take a unit to move a certain distance), which Rommel clearly lacked. Rommel's habitual preference for spur-of-the-moment decision making also tended to reduce his highly competent staff to the role of spectators rather than mission-planning specialists. The best that can be said about Rommel's style of manoeuvre warfare was that it contained a level of aggressiveness which caught the British by surprise, after months of fighting cautious Italian commanders. At the tactical level, German tankers performed well in an alien environment and gave a good account of themselves when allowed to fight as they had been trained. However, the use of tanks in the infantry support role at Tobruk and the wide dispersion of mechanized units were at odds with existing German tactical doctrine and served to reduce the probability of achieving worthwhile results. German Panzer units were not supposed to be used against fortified positions and experience against the French Weygand line in June 1940 indicated that artillery and anti-tank guns could inflict heavy losses when well integrated into a defence.[67]

British tankers were also ill-served by their senior commanders during Rommel's first offensive, primarily because they could not mentally adapt to the non-linear nature of what was occurring. Gambier-Parry was clearly unsuited for the task of leading an armoured division in the desert, and one wonders why an experienced RAC officer from 7th Armoured Division, such as Birks or Gatehouse, was not chosen instead of him. Once Rommel's offensive began, Neame and Gambier-Parry thought in terms of phased withdrawal lines on a map, with little reference to what the enemy was actually



After Operation *Compass*, all the Matilda tanks had to be sent back to Egypt for depot-level repairs. This Matilda displays the scars of three direct hits which did not penetrate the thick armour. Unfortunately, the initial ineffectiveness of Italian anti-tank weapons led some British tank commanders to begin using riskier tactics under the assumption that the Matilda was well-nigh invulnerable. (IWM, E2598E)

doing – which had not worked for French generals in May 1940. After Rommel took Agedabia, the 2nd Armoured Division scattered instead of concentrated; Gambier-Parry did not understand that the armoured brigade and support group were supposed to stay within supporting range, not fight separate battles. Constant retreats rapidly wore down the 2nd Armoured Division, with less than 10 per cent of its tanks lost to enemy action. Instead, Gambier-Parry should have made a stand somewhere north of Agedabia, while he still had nearly 100 tanks. At the tactical level, British tankers fought well against the German Panzer units, although the Mk IVA cruiser no longer had an edge in combat due to its inferior level of armoured protection compared to the latest German medium tanks. Both sides still had plenty of light tanks – Mk VIb, Pz II and CV-35 – but these obsolescent models were now proving to be liabilities on the battlefield.

At the operational level, Neame's hasty decision to evacuate Benghazi was a serious mistake because the terrain around that town favoured delaying operations. While the British recognized even before the loss of Agedabia that the enemy might try an outflanking manoeuvre through the desert, Neame failed to appreciate that the very survival of most of Rommel's forces depended on opening up the Via Balbia from El Agheila to Derna. For all their faults, the British Mk IVA cruiser tank, with some infantry and artillery support, would have been well suited to conducting an effective mobile delaying operation through the Jebel Akhdar mountains. One lesson that the Commonwealth forces learned the hard way during Rommel's first offensive was that the traditional method of trading space for time did not work well in the desert because of the non-linear nature of operations.

STALEMATE, MAY 1941

'We are the hunters/and even if the battle is hard/we defeat you, as always.'

Afrika Korps march, 1941

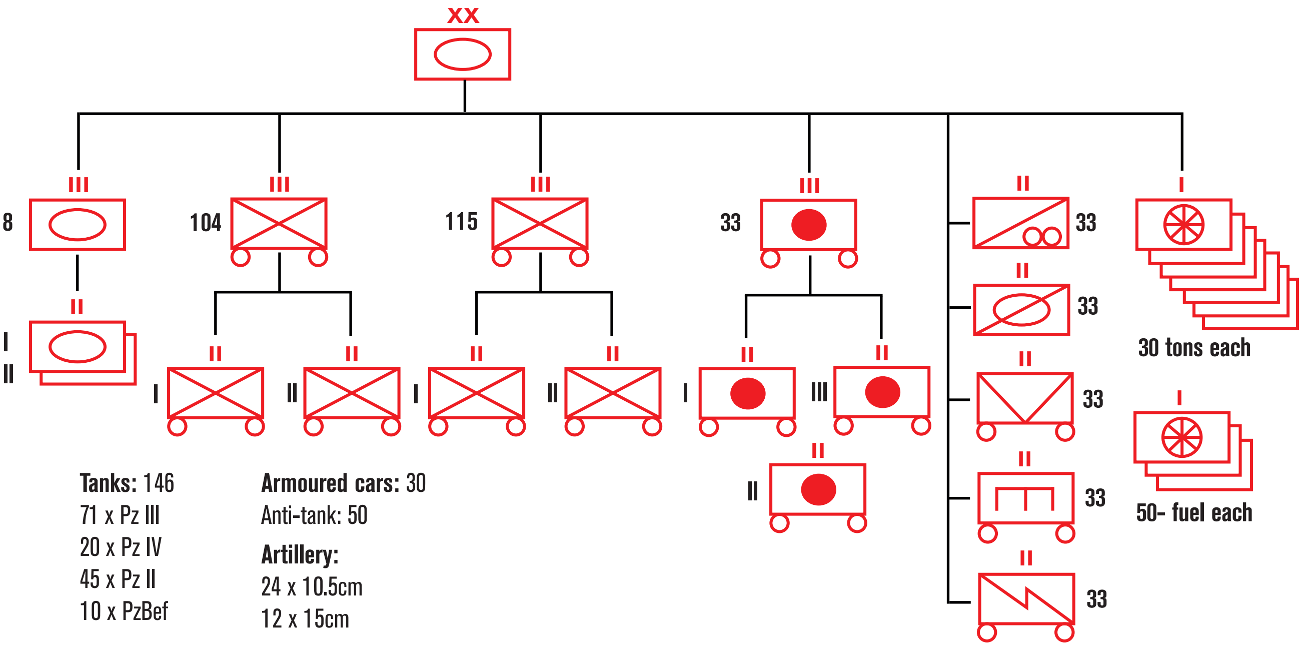
The DAK's logistic situation was far worse after Rommel's first offensive than it had been prior to it. The Italian-German forces in North Africa required roughly 3,100 tons of fuel, food, water, ammunition and other supplies per day. The port of Tripoli could handle 1,500–2,000 tons per day, but was now over 1,500 kilometres from the frontline.[68] Moving supplies from Tripoli required a very large number of trucks, well beyond the DAK's limited organic transport capacity. While the capture of Benghazi was helpful, this small port could only handle about 750 tons per day in May 1941 and it was regularly under attack by the Royal Navy and RAF. The Luftwaffe did have a significant air transport capability in Sicily and assigned III./KGzbV 1 to support the DAK. In reality, this meant groups of 25 Ju-52/3ms transports flying personnel and supplies to the Benina airfield near Benghazi and occasionally the Derna airfield. However, the total air transport capacity was only about 50 tons in one such lift and the Luftwaffe lacked the resources to conduct this scale of airlift on a daily basis.[69] Furthermore, RAF Hurricane fighters from Tobruk managed to shoot down several Ju-52 transports in April, which made Luftwaffe leaders averse to risking their limited number of transports close to the front. In short, the OKH and the Comando Supremo were correct in their assessments – Rommel lacked the supplies to mount another offensive.

The Axis supply problems also made it difficult for Pz.Regt. 5 to recover from its misadventures in Rommel's first offensive. First, disabled tanks and wheeled vehicles were scattered across the desert from Msus to Acroma and needed to be salvaged – using up more precious fuel. The main problem afflicting Oblrich's Panzers was sand ingested into the engines and transmissions, which mixed with normal POL fluids to form a sludge that increased friction to the point that pistons seized and power output dropped off. Unsurprisingly, the HL 120 TRM engine on the Pz III was not designed to operate at daily temperatures over 90°F (32°C) while full of sand. After recovery, the regimental Werkstatt mechanics could pull the engine (using the crane on an Sd.Kfz. 9/1 recovery vehicle) and attempt to clean the sand out of it, but while this process was straightforward in Europe, it proved difficult and time-consuming in the desert. Mechanics were forced to work out in the open most of the time because there were few buildings around and tents were easily knocked down during the frequent sandstorms. Sand also caused excessive abrasion on parts, particularly the critical cardan shaft (*gelenkwelle*) that linked the engine to the transmission. Rommel appealed to the OKH for new tank engines to be flown in – and a few were – but most tank crews received a rebuilt engine, which probably had limited lifespan left. Indeed, German industry was more focused on new tank construction at this point, in order to re-equip all existing Panzer divisions with modern weapons rather than spare parts. For example, only one spare Maybach SSG77 transmission for the Pz III Ausf H was built for every five made for new construction; in April 1941, roughly 40 spare transmissions of this type were built for the entire Panzerwaffe.[70] The DAK's ability to repair tanks in North Africa was also seriously limited by the lack of a local tank repair facility and spare parts depot. The OKH recognized this and recommended one be established in Benghazi, but this did not occur until July 1941. Consequently, the 5. leichte-Division could barely keep half of its armour running and, by the end of April, its remaining tanks were concentrated into Panzer-Abteilung Hohmann (Pz.Abt. Hohmann), which had a total of 79 operational tanks (nine Pz I, 24 Pz II, 36 Pz III, eight Pz IV, two Pz Bef).[71]

Paulus arrived at Rommel's headquarters on 27 April and found him preparing to launch another offensive at Tobruk within three days. Paulus knew that the DAK's situation was poor, but Rommel claimed otherwise. Using his influence in Berlin, Rommel had managed to persuade Hitler to authorize the airlift of one battalion from Schützen-Regiment 104 (S.R. 104) and some engineer companies to support another attack. Oberst Hans Henning von Holtzendorff, commander of S.R. 104, was among those personnel flown in to Benghazi, and Rommel put him in command of *Kampfgruppe* von Holtzendorff (three infantry, one Pioniere, one artillery and one anti-tank battalion). Most of the troops in this Kampfgruppe were not acclimatized to North Africa and the sub-units had not worked together before. It is also interesting that Generalmajor Hans-Karl von Esebeck had already arrived to take command of 15. Panzer-Division, but found Rommel treating his battalions like a replacement pool. Esebeck was a cavalryman, General Staff-trained and experienced in Panzer operations, but he was apparently ignored by Rommel. Streich was still in command of the 5. leichte-Division, but was on thin ice with Rommel, who was looking for an excuse to relieve him. Paulus initially tried to put a brake on Rommel's planned attack, but soon acquiesced.

Rommel had decided to mount a larger attack in the same sector where the Italians had failed on 15–16 April: Ras el Medawar. The Australian 26th Brigade held this sector and it had created a series of infantry strongpoints behind the anti-tank ditch, protected by mines and barbed wire. However, the

GERMAN 15. PANZER-DIVISION ORGANIZATION, 7 MAY 1941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30 tons each
I
50- fuel each
Tanks: 146
71 x Pz III
20 x Pz IV
45 x Pz II
10 x PzBef
Armoured cars: 30
Anti-tank: 50
Artillery:
24 x 10.5cm
12 x 15cm

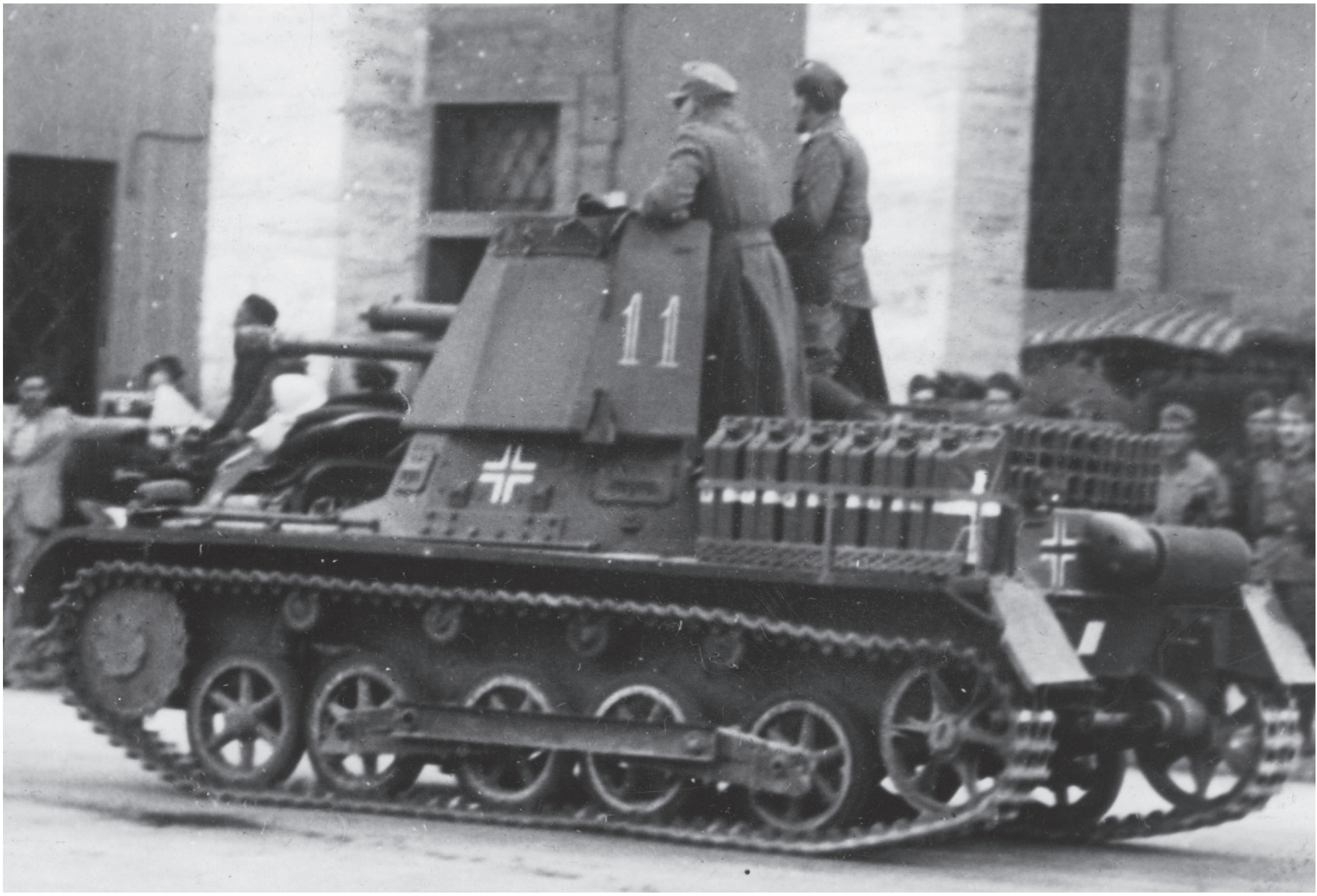
assigned sectors were far too large for the limited forces available; in the 2/24 Battalion sector, each of its three forward companies was responsible for a 2–3,000m-wide front. Each combat outpost on the outer perimeter only had about two infantry squads, armed with a medium machine-gun and perhaps an ineffectual anti-tank rifle. A total of ten anti-tank guns were allocated to defend this 8km-wide sector, which was also rather thinly spread. The garrison's small armoured reserve under 3rd Armoured Brigade had been reinforced with 14 additional Matilda II infantry tanks, all operated by Major Kenneth P. Harris' D Squadron, 7 RTR. Altogether, on the eve of the German attack, Lieutenant Colonel Drew's 3rd Armoured Brigade had 18 Matilda II, 17 cruiser tanks (eight A-9 or A-10, nine Mk IVA) in 1 RTR and one squadron of Mk VIb light tanks in the 3rd Hussars. Although the additional German infantry was helpful, the DAK still had very limited artillery and engineer support, which were just as essential for a successful breakthrough operation. In order to soften up the Australian defences, the Luftwaffe mounted four major raids on the positions of the 26th Brigade on 29 April, which inflicted about 50 casualties. However, the focus on this one sector deprived the DAK of any hope of achieving surprise. On the morning of 30 April, the Australians also spotted German infantry moving up toward the western perimeter, which alerted them that another attack was imminent.[72]

Rommel's new assault began with a night infiltration attack on the evening of 30 April by Kampfgruppe von Holtzendorff (three battalions) and a *Kampfgruppe* from 5. leichte-Division (two battalions) against the Australian 2/24th Battalion. The infiltration was preceded by another massed Stuka attack and a 60-minute artillery preparation by two German 10.5cm howitzer battalions. As dusk fell, the German infantry approached the anti-tank ditch, along with several companies of Pionier. The German bombardment did disrupt Australian wire communications, which made it difficult for individual positions to call for artillery support. Given the width of the sector, the single Australian battalion could not stop the enemy infiltration attack and, by 2100 hours, German infantry had succeeded in crossing the anti-tank ditch across a 2,000m front between the S3 and R3 positions (this critical sector was defended by a single Australian infantry company (A, 2/24). Engineers from Pionier-Batallion z.b.V. 200 cut the Australian barbed wire and filled the anti-tank ditch during the night (apparently with crushed rock) near the R1 position, while the German infantry tangled with the Australian combat outposts. The Australian 26th Brigade headquarters lost contact with most of its forward positions and had a difficult time assessing the extent of the enemy breakthrough, but moved up a reserve anti-tank company and alerted Drew's 3rd Armoured Brigade.[73] However, the Australians did remarkably little to interfere with the German breaching operation. At 0345 hours, Pz.Abt. Hohmann moved forward from its assembly area, 5 kilometres south-west of Ras el Medawar, and reached the primary breach site around 0545 hours. A pre-dawn ground mist helped to conceal the arrival of the German armour.

It must have taken a considerable amount of time to move the Panzer-Abteilung across the breach site (which was not under artillery fire due to the Australian loss of wire communications), but Hohmann seems to have been able to quickly deploy his Panzers once on the other side. Rather than move in a concentrated wedge as in the previous attack, Hohmann assigned separate missions to his first two companies across: two platoons from Oberleutnant Hans Sandrock's 5. Panzer-Kompanie would help infantry from M.G. Btl. 2 eliminate the Australian R5 outpost, while its other tank platoon helped clear the enemy from the top of Ras el Medawar. At the same time, the 6. Panzer-Kompanie would advance into the depth of the Australian 2/24th Battalion's positions in order to overrun its command posts and reserve positions. The remainder of Pz.Abt. Hohmann, the Stab, 7. and 8. Panzer-Kompanien, would follow and support. The Australian 26th Brigade was not immediately aware that German armour had succeeded in crossing the anti-tank ditch until tanks were spotted atop the Ras el Medawar around 0800 hours. At this point, four Australian anti-tank guns began to engage Sandrock's tanks, claiming one Pz III and two other tanks, but all four guns were eventually destroyed.[74] Once these anti-tank guns were knocked out, the 6. Panzer-Kompanie pressed on to the north-east, but ran full tilt into a British minefield, which immobilized 12 tanks (three Pz II and nine Pz III).[75] Leutnant Schorm's Pz III hit one mine, breaking its right track, then hit another mine when he tried to back up, breaking his left track. Schorm transferred to another tank while his crew tried to repair their damaged tracks while under fire.[76] However, since the German Pionier were still tied up at the breach site, no effort was made to clear any of the mines in front of the 6. Kompanie. Despite the lack of forward observers with effective communications, the British artillery began to make life difficult for the Germans by bombarding the area around Ras el Medawar.

The lack of solid information about the strength of the enemy breach operation made Drew reluctant to commit his armour, and initial reporting about German tank movements proved inaccurate. The British armoured reserve was located about 6 kilometres east of the on-going action and the fog of war made it difficult for Drew to determine the optimal time to commit it to action. The Australian frontline infantry positions were not asking for tank support, although Drew was unaware that 26th Brigade had lost communications with its 2/24 Battalion. Nevertheless, around 1000 hours, Drew could see that a major German attack was in progress and he decided to commit B Squadron, 1 RTR (five cruisers), with orders to support the 26th Australian Brigade. Moving westward, B Squadron soon bumped into Sandrock's 5. Kompanie and engaged in a brief duel at 1,000 metres that caused little damage to either side; the British tankers complained that dust and smoke near Ras el Medawar reduced visibility. Both sides broke contact but another tank skirmish occurred around 1135 hours, when nine more cruisers from C Squadron 1 RTR arrived. This time the action occurred at a range of about 700–800 metres and the British claimed one Pz III and two Pz II tanks set on fire, but one of their own cruisers was destroyed and another disabled. Around noon, Drew decided to commit half the Matilda IIs of 7 RTR, but three fell out as mechanical casualties and another was put out of action by a Stuka attack, leaving just five to join the remaining 12 cruisers of 1 RTR. By mid-afternoon, the British armour was slowly advancing westward along the outer perimeter, from R14 to R4, but neither group of tanks could communicate due to radio issues. The Germans spotted the approaching British tanks and had plenty of time to deploy virtually all their remaining tanks in an L-shaped formation, and opened fire. It is likely that some of the Pz III tanks were equipped with the Panzergranate 40 (Pzgr 40) tungsten-core APCR round, since two Matilda II tanks were destroyed and two more put out of action; a total of three Matilda II tank commanders were killed in action. Two cruiser tanks from 1 RTR were also disabled. Nevertheless, British return fire was accurate, hitting four German tanks. Out-numbered, the British tanks withdrew, leaving the German armour remaining near Ras el Medawar.[77] Late in the day, some tanks from the 'Ariete' Division crossed into the breach and used CV-33 flamethrower-equipped tankettes to burn out some of the Australian infantry positions that were still holding out.

Rommel succeeded in punching a dent into the Australian defensive line and capturing Ras el Medawar, but his losses in men and materiel outweighed this gain. By late afternoon, Pz.Abt. Hohmann had been reduced to only 35 operational tanks (although only 14 of those were total losses). Most of the tanks had been disabled by mines, artillery and anti-tank guns, against only seven lost to enemy tanks. While the British after-action report admitted only three tanks destroyed and two damaged, a good portion of their tanks were non-operational at the end of the day as well.[78] Neither side had used their armour particularly well on 1 May, although the Germans did demonstrate increased competency in breaching a fortified line and fending off enemy armoured counter-attacks. For the Commonwealth forces' part, Lieutenant Colonel Drew's piecemeal commitment of his 3rd Armoured Brigade violated the basic principles of how to use a mobile reserve, which was exacerbated by the failure to redress communications issues between the two tank battalions prior to battle. Late in the day, the 26th Australian Brigade finally launched its own counter-attack, using just two companies of its reserve 2/48th Battalion, which were repulsed. Had the 3rd Armoured Brigade and the 26th Australian Brigade worked together to mount a co-ordinated counter-attack, the DAK would likely have suffered a stinging tactical defeat at Ras el Medawar. Instead, the Australian 2/24 Battalion was essentially left to fend for itself and its

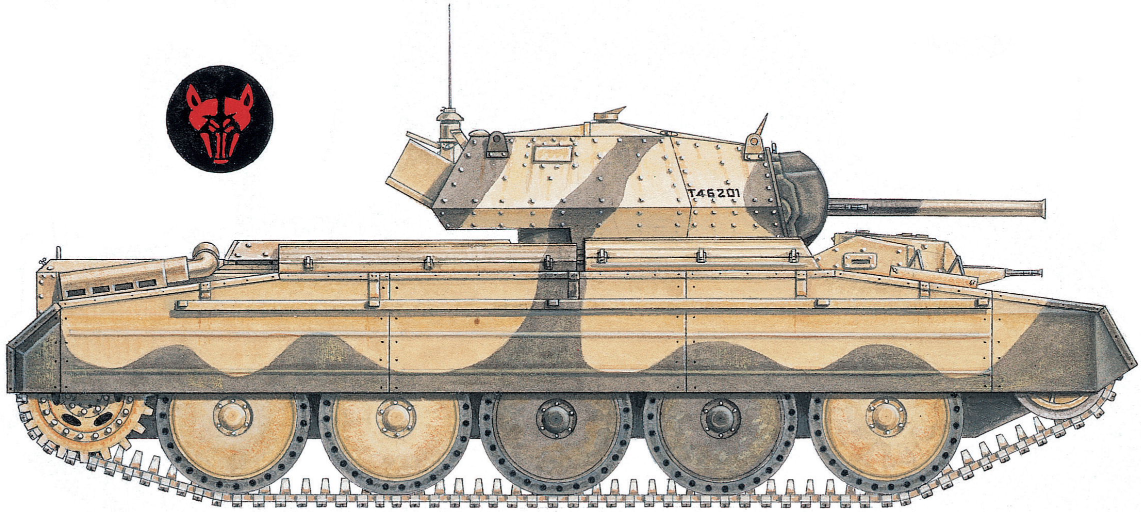


The Afrika Korps also brought an anti-tank battalion equipped with Panzerjäger I tank destroyers. In 1940, the Germans decided to mount a Czech 4.7cm gun on the hull of a Pz I tankette, which was effective against all British tanks except for the Matilda. The 20-litre jerrycans marked with white crosses are for water. (SDZ, 00333340) encircled positions were silenced one by one. Eventually, the Australian 9th Division was able to seal off the penetration around Ras el Medawar, preventing further enemy exploitation eastward.

The action at Ras el Medawar also exposed endemic problems with British Army communications that had been surfacing since the beginning of the desert campaign. Despite the Royal Tank Corps' experiments with wireless radio communications at Tidworth in the 1930s, the British Army had not invested enough resources into developing modern radios and training in their use until the Second World War began. Although the RAC and the Royal Artillery recognized the importance of wireless radios, most of the other British combat arms were still heavily dependent upon First World War-style wire communications. A typical Commonwealth infantry division in 1940 and 1941 only had 75 radios, of which two-thirds belonged to the artillery units. The two types of wireless communications were R/T (radio telephony or voice) and W/T (wireless telegraphy or morse); the quality and range of voice messages was poor, while tactical commanders did not like to use W/T because it was slow. While each British tank had a radio transmitter/receiver in 1941 the cruisers and light tanks had the No. 9 Wireless set, while the infantry tanks had the No. 11 Wireless set; both were low power output systems that operated in the High Frequency (HF) range. Tuning radios was a necessary part of pre-combat activities that was often given short shrift. In contrast, the DAK Panzer units were operating with high power output radios operating on Very High Frequency (VHF) and DAK commanders were well trained in radio procedures. British tactical radio procedures in 1940 and 1941 were also rather poor, particularly in terms of radio security (units would use the same call sign, making it easy for the Germans to identify armoured units) and the limited number of frequencies available. The British Army's communications problems had not mattered against a passive Italian foe in 1940 (who possessed no radios on their tanks at all), but would prove costly against an enemy well-versed in how to employ tactical communications in a mobile battle.

After the limited success of the 1 May attack, the OKH ordered Rommel to shift to the defence and conserve his strength. For both sides, the operational focus shifted from Tobruk to the Libyan-Egyptian border area. Rommel decided to reinforce Kampfgruppe von Herff with several Italian units, which were intended to hold the Halfaya Pass, Bardia and Sollum, leaving von Herff's German units free to conduct a mobile defence. On the night of 10/11 May, Rommel also transferred Pz.Abt. Hohmann (with 27 tanks) to von Herff's command. At this point, von Herff was essentially tasked with a counter-reconnaissance mission to prevent the Commonwealth forces from re-establishing ground contact with the encircled Tobruk garrison.

In Egypt, the British hastily cobbled together a relief force, re-designated once again as the Western Desert Force (WDF), with Lieutenant General Noel Beresford-Peirse in command. However, Beresford-Peirse was essentially a resource manager, and tactical command was in the hands of 7th Armoured



Crusader Mk I, 10th Armoured Division. The Mk I still had the useless machine-gun turret on the front slope, which was removed on the subsequent Crusader Mk II. (© Osprey Publishing Ltd, by Peter Sarson. From NVG 14 *Crusader and Covenanter Cruiser Tanks 1939–45*)

Division officers, particularly Brigadier Gott. Unfortunately, the 7th Armoured Division was still struggling to rebuild its armoured units, which lacked spares almost as badly as the DAK's Panzer units. The difference was that the RAOC depot in Abbassia had the workshops to repair some tanks and fabricate parts, which enabled the 7th Armoured Division to slowly rebuild its strength. Some of 7 RTR's Matilda II tanks had already been repaired and sent to Tobruk by sea. Lieutenant Colonel Rowland F. E. Chute, the new commander of the 2 RTR, was provided with 36 re-fitted cruiser tanks (primarily obsolescent A9s and A10s). Two squadrons from Lieutenant Colonel Walter O'Carroll's 4 RTR had arrived by sea in Suez, with a total of 33 Matilda IIs. Including the remaining Mk VIb light tanks, by early May the WDF had assembled a total of 117 tanks. Support forces were also limited, but included five infantry battalions, one 25-pdr howitzer regiment and the 11th Hussars – the equivalent of two incomplete brigades.

Unlike Operation *Compass*, the WDF cooked up Operation *Brevity* with little planning or preparation. It is also bizarre that the most experienced British armour officers in Egypt – Creagh, Caunter, Gatehouse and Birks – were not involved in planning *Brevity*, but instead an infantry officer who had not previously commanded tanks was given tactical command of the operation. Gott had been in charge of a miniscule motorized covering force in the Bardia-Sollum area since mid-April and had been gradually pushed back across the border by Kampfgruppe von Herff. Wavell wanted Gott's so-called 'mobile force' to launch a limited spoiling attack in order to put some pressure on Rommel and force him to divert forces away from Tobruk. He also knew that significant armoured reinforcements were en route from England, so Operation *Brevity* was regarded as a precursor attack to pave the way for a larger armoured strike in June.[79] For his part, Gott intended to conduct a limited offensive to capture the Halfaya Pass, but was willing to keep his options open to press onward in case enemy resistance proved less than expected. Gott certainly hoped that the Matilda II tanks would once again prove decisive, but O'Carroll's 4 RTR got off to a poor start by losing a total of seven Matilda IIs in the movement to the front from a combination of accidents and mechanical breakdowns. By 11 May, 4 RTR had managed to coax 26 of its Matildas to an assembly area near Sofafi, roughly 50 kilometres south-east of Halfaya Pass.

Gott's tactical plan was to advance in three columns, with the primary objective being the recapture of Halfaya Pass. A northern column (one infantry battalion, one artillery battalion) would advance along the coast and seize the lower eastern end of the pass. The central group, composed of Brigadier Ian D. Erskine's 22nd Guards Brigade Group (4 RTR and three infantry battalions), was the main effort and would seize the western end of the pass, which lies up high on the escarpment. Brigadier Russell's 7th Armoured Brigade Group, with 2 RTR, 3rd and 11th Hussars, would protect Erskine's left flank and serve as a potential exploitation force if conditions were favourable. Thanks to ULTRA and other forms of intelligence, the British were aware that the 15. Panzer-Division was arriving in Libya, so Gott knew that Operation *Brevity* would have to strike and achieve its objectives quickly before the DAK could react.

British armoured doctrine had been slightly modified since Operation *Compass* had been conducted, in part due to the success of 7 RTR against the Italian camps. ATI No. 2, issued in March 1941, placed greater emphasis on the first tank echelon in an assault acting boldly, whereas the follow-on infantry were essentially relegated to marching on to the objective once the tanks captured it.[80] The new doctrine was also influenced by the perceived invulnerability of the Matilda II to current enemy anti-tank weapons.

On the night of 14/15 May, the three British tactical groups advanced towards their objectives. The 4 RTR approached Halfaya Pass from the south. The Halfaya Pass, which is about 3.5 kilometres in length, was defended by a mixed Axis force comprising two companies of the V Battaglione Bersaglieri (known as the Montemurro detachment), a battery of 47mm anti-tank guns, a battery of 75/28 guns and the 2./Kradschützen-Bataillon 15.[81] The Italians had deployed no mines or anti-tank obstacles, but they had cleverly formed stone wall defences (*sangar*) around their positions. Major Cecil G. Miles led the attack just after dawn with his C Squadron, 4 RTR, with one company of infantry from the 2nd Battalion Scots Guards trailing over 1,000 metres behind. The Italians were caught by surprise but it was quickly evident that they had learned a few things since the action at Nibeiwa camp five months earlier. The British Matilda II tanks charged forward, ignoring the ineffectual Italian fire and some drove up on to the stone *sangar* walls, exposing their thin belly armour. Although the Matilda's thick hides were generally impervious to the Italian 47mm anti-tank guns, their 20mm belly armour was not and the Italian gunners concentrated on this weak spot. Based upon O'Carroll's after-action report and limited photographic evidence, it is known that seven Matilda II tanks were knocked out through a combination of hits on the thinner belly armour and suspension systems.[82] Interestingly, 4 RTR reported no personnel casualties in any of these immobilized tanks, suggesting that the damage was mostly external.[83] Despite this success, Axis resistance collapsed once British infantry arrived, and about 300 prisoners were taken (including almost all of the German company). Meanwhile, the northern column, which lacked tank support, was unable to quickly seize the eastern end of the Halfaya Pass, which was held by one company of *bersaglieri* troops. Eventually, with the support of Blenheim bombers, the last Axis positions were overcome later in the day.[84]

With part of Halfaya Pass secured, the 4 RTR pushed north to seize its secondary objectives, beginning with Musaid, which controlled the road to Sollum. Part of the central column proceeded to occupy Sollum. A Squadron (nine Matilda II) under Major I. A. D. Banks then pivoted west toward Fort Capuzzo, followed by troops from the Durham Light Infantry (DLI). Meanwhile, Pz.Abt. Hohmann had moved forward to the Fort Capuzzo area to block any enemy movement toward Bardia. Communication problems led to two Panzer companies heading off in the wrong direction, but Hoffmann led the Stab and 5. Kompanie toward Fort Capuzzo. When Hohmann spotted Major Banks' tanks approaching around 0830 hours, he deployed his dozen tanks on line in hull-down positions and opened fire when the British came within range. It appears likely that the German tanks had some Panzergranate 40 APCR rounds because five Matildas were disabled. Nevertheless, Banks continued to advance toward the fort, not realizing how badly he was out-numbered. Two Matildas crashed through the wire around the fort, followed by some of the British infantry. By 0915 hours, Hohmann decided to pull back because his tanks had expended all their ammunition, so the British were temporarily able to capture the fort. However, the 4 RTR had very few tanks left in the fight and after replenishing his ammunition Hohmann was able to mount a counter-attack around 1400 that convinced Major Banks that it was time to leave this exposed position. The DLI was badly mauled by the German armoured counter-attack and suffered 160 casualties, including 70 men taken prisoner.[85] Four disabled Matildas were abandoned near the ruins of Fort Capuzzo. By evening, the British had occupied Sollum and Halfaya Pass, but O'Carroll's 4 RTR was reduced to only six operational Matildas and another four immobilized tanks were destroyed the next day. During the night of 15/16 May, the British were chagrined to find that the Germans had already recovered several of their damaged Matilda II tanks from the battlefield.

While the 4 RTR was engaged in the main attack, the 2 RTR, 3rd Hussars and 11th Hussars had moved forward to protect the desert flank. The 7th Armoured Brigade Group used three mixed Jock Columns in its flank security mission. The Axis deployed a small screening force around Sidi Suleiman, which included some motorized units and at least one platoon of tanks from Pz.Abt. Hohmann. Around 1000 hours, 2 RTR engaged in sporadic skirmishing with the German covering forces around Sidi Suleiman and claimed to have knocked out a Pz IV tank and one Pz III, but German sources state that only one Pz II was lost. One 2 RTR cruiser tank was put out of action during the skirmishing. The only significant result achieved by the 7th Armoured Brigade during Operation *Brevity* occurred when nine cruiser tanks from A Squadron were sent on a combat patrol toward Sidi Azeiz late in the afternoon. After observing some German units at a distance, the patrol turned around and returned toward the border area. When Rommel received reports about this British force, he over-reacted and regarded it as an indication that Kampfgruppe von Herff was defeated and that British tanks might even be advancing toward Tobruk. Consequently, Rommel made one of his characteristic spur-of-the-moment decisions to send major reinforcements to the border area.

Oberstleutnant Hans Cramer's Pz.Regt. 8 from the 15. Panzer-Division had just arrived at Acroma, near Tobruk, 48 hours earlier.[86] Cramer's Panzers had just completed a 1,300-kilometre road march from Tripoli and were in need of rest and repairs before being committed to action, but Rommel ignored these factors. Instead, Rommel ordered Cramer to immediately dispatch Major Crohn's I/Pz. Regt. 8 to support Kampfgruppe von Herff, and the rest of the regiment was to follow. Cramer's tankers had to conduct a night road march of about 130 kilometres in an unfamiliar area and link up with Kampfgruppe von Herff before dawn. Although Crohn's battalion reached Sidi Azeiz around 0300 hours, the British were long gone and the link-up with von Herff's command did not occur. Furthermore, Rommel had not ensured that any logistic arrangements were made to cover this major armoured movement, so Cramer's Pz.Regt. 8 soon found itself out of fuel and quite alone in the desert. Cramer's Panzers spent the next 14 hours immobilized until fuel finally arrived. Furthermore, more than half of Cramer's Panzers had broken down from mechanical failures en route, leaving his regiment in a poor condition. Unaware of the German difficulties, Gott was unwilling to leave his small forces exposed across the border in Libya and during the night of 15/16 May he ordered a withdrawal back to the line of Halfaya Pass-Sidi Suleiman.

Both sides badly mis-used their armour during Operation *Brevity*. The British confidence in the impregnability of the Matilda II led to heavy losses against an enemy that was learning how to counter this tank; 4 RTR was essentially *hors de combat* after just a few hours of combat. Both the 7th Armoured Brigade Group and Pz.Abt. Hohmann spent an entire day jockeying for position and then only briefly exchanged ineffectual jabs. Nor did either side show much acumen in command and control or logistics over the course of 15 May, with company-size elements wandering aimlessly around the battlefield, then running out of fuel. One interesting aspect is the German reticence to commit their battery of 8.8cm Flak guns to stop the British armour; von Herff kept them back in reserve when they should have been deployed forward at Fort Capuzzo.

After the British withdrawal into Egypt, von Herff was able to re-occupy all of the frontier outposts within a few days, including Sollum. Gott deployed Lieutenant Colonel John Moubray's 3rd Battalion Coldstream Guards to defend Halfaya Pass, along with four 25-pdr guns, eight 2-pdr anti-tank guns and Major Miles' C Squadron 4 RTR (nine Matilda II). Gott had no real mobile reserve to support Moubray, since 2 RTR had been reduced to just 22 operational cruiser tanks, most in poor mechanical condition. Von Herff spent a week conducting reconnaissance patrols across the border into Egypt, which revealed how thin the British were on the ground, while preparing a counter-attack. Hot weather, daily sandstorms and fuel shortages delayed the German response, but by 25 May the DAK had re-deployed the bulk of its available armour to support von Herff's counterstroke, which was designated *Unternehmen Skorpion* (Operation *Scorpion*).

It is not clear who planned *Skorpion*, but the operation was overly complex and not the kind of work done by Großer Generalstab-trained officers. Three German Panzer battalions (I., II./Pz. Regt. 5 and I./Pz. Regt 8), with a total of about 75 tanks, were assembled into Panzergruppe Cramer to serve as the main manoeuvre force; this was the first German multi-tank battalion attack in North Africa. Two mixed *Kampfgruppen*, Group Bach (one reinforced infantry battalion and an anti-tank detachment) and Gruppe Knabe (Kradschützen-Bataillon 15 and one artillery battalion), were assigned to support the attack on Halfaya Pass, while von Wechmar's A.A. 3 provided flank security in the desert to the south of the pass. The plan was noticeable for its lack of fire support (only a dozen 10.5cm howitzers and no Stukas), its lack of clear sub-unit objectives and the failure to lay in adequate fuel to enable Panzergruppe Cramer to conduct effective manoeuvre warfare (ergo, if you only have fuel for 50 tanks, don't assign 75 to the mission). Although Cramer was clearly concerned about the British Matilda II tanks at Halfaya, once again the 8.8cm Flak Batterie was left in reserve.

Unternehmen Skorpion began on 26 May, with German forces cautiously crossing the Egyptian border at several points. Gruppe Bach inched slowly along the coast toward Halfaya Pass, hugging the escarpment for cover, while Gruppe Knabe moved slowly along the top of the escarpment – these forces were intended to be noticed. The British quickly detected the enemy activity and Major Miles decided to conduct an active defence by leading his nine tanks on a sweep north-west of the pass. Miles' tanks encountered a German combat patrol from Gruppe Knabe and destroyed one Pz III tank, but one Matilda was damaged by return fire. Throughout the afternoon, Miles parried any attempt by Gruppe Knabe to get closer to Halfaya, but a combination of combat damage and mechanical defects quickly wore down his squadron to just two operational Matilda II tanks by evening. Meanwhile, Cramer's Panzers waited until 1500 hours until moving, then advanced in two-up, one-back formation. Rather than advancing directly upon Halfaya Pass, Cramer's Panzers pushed about 30 kilometres to the south, past Sidi Suleiman, then pivoted to the north-east and stopped to laager at 2020 hours, seven kilometres south of Halfaya Pass. Since the fuel column failed to find Cramer's Panzers during the night, they were nearly out of fuel.[87] Apparently, Cramer's move was intended to envelop Halfaya's defences from the south and prevent interference from the 7th Armoured Brigade Group (which had fallen back).

At dawn on 27 May, all three German *Kampfgruppen* converged on

Halfaya Pass. The British 25-pdr battery spotted Cramer's Panzers from the south and hit them with a barrage, but the German tanks continued to advance. By this point, Lieutenant Colonel Moubray could see that his battalion was under fire from three directions and at 0700 hours he ordered the position to be evacuated. Major Miles' remaining tanks were ordered to conduct a rearguard, as the British headed down to the bottom of the pass and escaped eastward. Some of Cramer's Panzers ran out of fuel just as they reached the top of the escarpment, but the rest poured fire on the retreating British. The British Matildas were hit by 3.7cm and 5cm fire from behind and above, which did considerable damage to their turrets. It also appears that Panzergruppe Cramer had some Panzergranate 40 APCR rounds, given photographic evidence of hull and turret penetrations. In any case, most of the British force succeeded in escaping, but 4 RTR had lost a total of seven of nine Matildas (three of which were repaired by the Germans). In addition, the British lost most of their heavy weapons assigned to defend the pass.[88]

While *Unternehmen Skorpion* achieved its immediate objective of recapturing Halfaya Pass, it was a rather slipshod operation that really only succeeded because Gott's forces along the Egyptian border were so threadbare at this point. If the British had mined the approaches to Halfaya and had a full tank regiment in reserve, Moubray's force should have been able to withstand at least the first enemy assault and wait for relief. Cramer's roundabout movement to Halfaya Pass needlessly consumed his limited fuel supplies and left his regiment partly immobilized on the objective. Once the Germans had recovered Halfaya Pass, Rommel immediately ordered the position fortified, anticipating a British response.

However, the British response would take over two weeks to organize. The British armoured forces in Egypt had sunk to such a low ebb because fewer than 400 tanks had been sent from England since July 1940, just 29 per cent of Britain's total tank production in this period. Of the tanks sent to the Middle East, about one-quarter were lost in the expedition to Greece. In late April, the 3 RTR and 4th Hussars returned to Egypt with none of their tanks and less than half their personnel.[89] Furthermore, most of the spares for the Mk IVA tanks had been sent to Greece by mistake and lost in the retreat, depriving Gott of the resources to resuscitate some of his non-operational tanks. Indeed, the RAC depot at Abbassia still had large numbers of tanks that could not be repaired due to the lack of spares. On 20 April, Wavell appealed to London for help and highlighted the arrival of the 15. Panzer-Division (learned from interception of Enigma traffic) as providing the enemy a crucial advantage in armoured capability.

Wavell's command was in fact suffering the consequences of a series of poor decisions made earlier by the War Office. Anticipating that the A-13 cruiser tank would require further enhancements in mobility and armoured protection, in April 1939 the General Staff had prevailed upon the War Office to issue contracts for two variants, to be developed by Nuffield Mechanization (which was already involved in manufacturing the Cruiser Mk III and Mk IV) and the London, Midland and Scottish Railway Company (LMSR), a company with no prior experience in designing or building tanks. Neither company produced a prototype for their variant – the War Office simply placed orders based upon promised specifications and hoped for the best. Nuffield was able to develop its Cruiser Mk VI in straight-forward fashion, based on its experience with the earlier marks; the Mk VI was 5 tons heavier than its predecessors and had five road wheels on each side instead of four, which enhanced its cross-country mobility. However, the Mk VI still had a useless auxiliary turret on the front slope (which would be eliminated in the Crusader II in late 1940) and its level of armoured protection was still inadequate. In contrast, LMSR tried to develop a more innovative tank and

A Panzerbefehlswagen III, possibly Major Bolbrinker's, leads a dusty column from Pz.Regt. 5 toward Mechili on 7 April 1941. Rommel's ill-judged advance through the desert incapacitated most of his armour for several weeks. (SDZ, 00333430) promised welded armour and a new transmission, but their Cruiser Mark V proved to be a mechanical disaster. In particular, the engineering decision to mount the tank's radiators in front led to recurring engine over-heating problems that could not be rectified. Nevertheless, by mid-1940 the War Office wanted over 9,900 cruiser tanks and both designs were taken into service and large production orders placed. To add to the already chaotic nature of British tank designations, the War Office decided to redesignate the Cruiser Mark V as the Covenanter tank and the Cruiser Mk VI as the Crusader tank.[90] By the end of 1940, both tanks were beginning low-rate production, but this came at the cost of phasing out the Cruiser Mk IVA. Thus, by the start of 1941, the production run of the Mk IVA had ended, but both the Covenanter and the Crusader were plagued by a myriad of design defects, so a total of only 167 of both models were built between January and March 1941.

Table 6: British Tank Programmes, 1940–41

	A-13 Mk III, Cruiser Mk V Covenanter	A-15 Cruiser Mk VI Crusader Mk I	A-22 Infantry Tank Mk IV Churchill
Requirement	February 1939	February 1939	June 1940
Developer	LMS (Crewe)	Nuffield Mechanization and Aero Ltd	Vauxhall Motors
1st prototype	May 1940	April 1940	December 1940
Orders	1939: 350 1940: 150	1940: 300	1940: 500
Production begins	December 1940	January 1941	June 1941
Manufacturers	LMS (Crewe) English Electric Valve Co. (Stafford) Leyland (Kingston)	Nuffield Mechanization and Aero Ltd	Vauxhall Motors

While seeking to create a vast fleet of cruiser tanks, the War Office was also trying to field a large number of infantry tanks. Both the Matilda II and Valentine tanks were already in low-rate production by the summer of 1940, but the War Office was eager to incorporate some lessons learned from the campaign in France into a new infantry tank. Four prototypes of an earlier design, the A-20, were available in June 1940, but they were judged inferior to contemporary German designs. Instead, the War Office decided to update the requirement to A-22 and hand over a design contract to Vauxhall Motors, which was making trucks for the Army but had no prior tank design experience. Amazingly, Vauxhall was able to design the new tank, designated as the Infantry Tank Mk IV or Churchill, in just six months. The Churchill was much larger than the Matilda II – 39 tons versus 25 tons – and had much thicker frontal armour, but it was slow and had an operational radius of just 90 kilometres. Taking a page from the French Char B1bis design, Vauxhall decided to equip the initial version of the Churchill with a turret-mounted 2-pdr gun and a hull-mounted 3-inch howitzer. Although the Churchill was not ready to begin mass production until June 1941, the construction of the Matilda II and Valentine tanks was well in hand, with a total of 469 built in January–March 1941. Thus, in the first half of 1941, Britain's tank production was still quite anaemic and two-thirds of those vehicles manufactured were infantry tanks, not well suited to manoeuvre warfare over long distances in the desert.

Wavell's armoured force was negatively impacted by two other poor decisions made by the War Office. Although the Royal Ordnance Factory at Woolwich had been assigned to develop a successor to the 2-pdr gun, the 6-pdr (57mm), the project had not been assigned a high priority. Furthermore, none of the multitude of tank designs approved by the War Office between 1938 and 1940 were designed with a larger gun in mind. Royal Ordnance was able to develop an efficient 6-pdr gun by mid-1940, but getting the weapon into production and then mounted in British tanks proved to be a major challenge in the post-Dunkirk environment. Woolwich's production of the 2-pdr gun was also quite low – barely 200 per month in 1940 – and the same weapon was used on both tanks and in anti-tank units. Disrupting the limited 2-pdr production in order to get the 6-pdr into service would have virtually halted British tank production for several months, which was unacceptable. Since Britain's best available tank, the Matilda II, had a turret ring that was too small to accept a 6-pdr gun mount, the issue rapidly became moot. Consequently, Woolwich would not begin production of the 6-pdr gun until November 1941 and it would not be mounted on a British tank until May 1942. British tankers in North Africa would have to rely upon the 2-pdr and its lack of an HE shell for another year.

Finally, the War Office continued with its plans to vastly expand Britain's armoured forces after the French campaign, despite limited tank production and experienced instructors. Three armoured divisions (6, 8 and 9) were formed from the TA units and Yeomanry in late 1940, on top of re-equipping the decimated 1st Armoured Division. In addition to several independent armoured brigades, this decision created a requirement to outfit nearly 40 armoured regiments in the United Kingdom with over 2,000 tanks. There were still lingering concerns that the Germans might try to mount an invasion (*Unternehmen Seelöwe*) of England in the summer of 1941 and a large armoured reserve was deemed critical for dealing with any landings. Yet the creation of so many armoured units so quickly resulted in hollow formations, with few tanks or trained personnel. By early 1941, even the 1st Armoured Division was just beginning to receive new cruiser tanks and was far from combat-ready. Given the paucity of tanks available, the tanks that were available were hard-used in training, leaving no pool of brand-new, fully operational vehicles. Although General Alan Brooke, commander of Britain's Home Forces, advocated a greater investment in creating adequate spare parts for armoured units, Churchill rejected this notion as wasteful and insisted on building new tanks rather than repairing existing ones (Hitler held exactly the same view about spares).[91]

When Wavell's plea for armoured reinforcements reached London on 20 April, the British Army was not yet in a position to provide much help. The 7th Armoured Division had not recovered from the losses suffered in Operation *Compass* and Greece, leaving Wavell with no significant combat-ready mechanized unit in the Middle East. With typical alacrity and resolve, Churchill agreed to immediately dispatch a tank brigade to the Middle East, with another to follow later in the year.[92] General John Dill (CIGS) tried to oppose the idea of sending hastily trained armoured units to the Middle East but lost the argument with Churchill.[93] With input from Martel (now head of the RAC), Dill decided to select the 1st Army Tank Brigade (8 RTR, 42 RTR and 44 RTR) with its 174 Matilda II tanks for deployment to the Middle East. In addition, 67 Crusader Mk I (Mk VI cruiser) tanks were taken from the 1st Armoured Division in order to re-equip one armoured regiment in Wavell's command.[94] Given what the British Army already knew about tank warfare in North Africa, it would have been better to send more cruiser and fewer infantry tanks, but it was already apparent that the Covenanter tank was unsuited for combat and two-thirds of production output was focused on infantry tanks. Churchill wanted an immediate armoured reinforcement for Wavell's command and the 1st Army Tank Brigade was the only unit deemed reasonably fit for deployment. Given that the Second World War was already in its second year and Britain had no other ground commitments at the time, this was a sad state of affairs.

Within a week of Churchill's decision, the 1st Army Tank Brigade and its 295 tanks were in Scotland, preparing to embark on the WS.8A convoy.[95] However, Churchill was unwilling to wait for the convoy to take the six-week-long route around the Cape to Egypt and instead demanded that the tanks be sent 'at all costs' directly through the Mediterranean. Given the threat posed by Axis air and naval forces, the decision was made to send the tanks on five fast transports through the Mediterranean (the Tiger convoy) and the personnel via the safer cape route (the WS.8A) convoy. The Tiger Convoy passed from Gibraltar to Malta, but lost the SS *Empire Song* to mines on 9 May; this vessel was carrying the 50 Matildas and seven Mk VI light tanks that belonged to the 8 RTR. The remaining four ships reached Alexandria on 12 May, delivering a total of 238 tanks. However, the personnel of the three tank regiments, going the long way around the horn of Africa, would not reach Egypt until 13 June. From the beginning, Churchill possessed unrealistic expectations about what these tanks could achieve, but confidently predicted that Wavell would use them to sweep every German out of Cyrenaica by the end of June.[96]

OPERATION *BATTLEAXE*, JUNE 1941

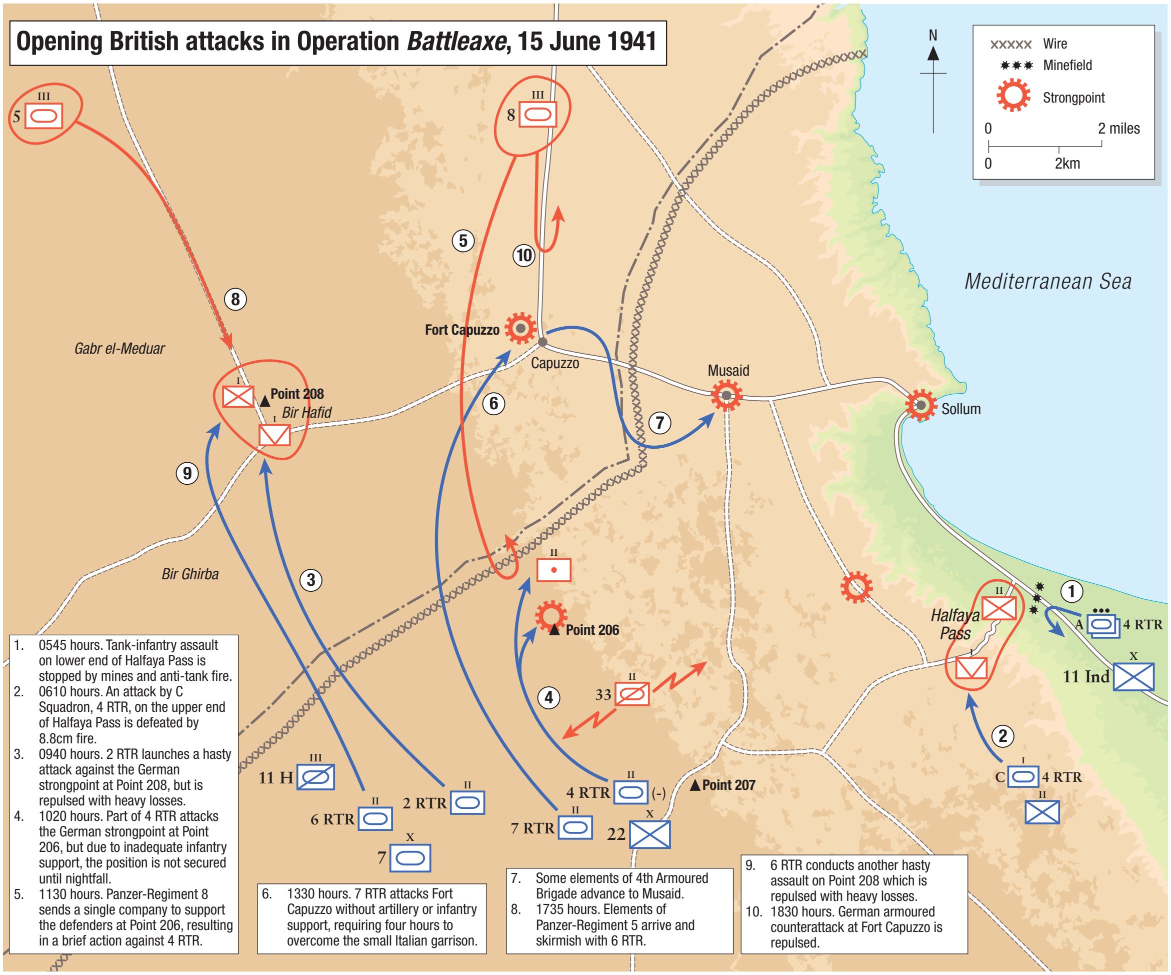
'They are tearing my tanks to bits!'

Major Cecil G. Miles, C Squadron, 4 RTR, 15 June 1941[97]

Once Wavell learned that armoured reinforcements were en route, he began planning a major offensive to strike the Axis forces along the Egyptian frontier (based on Churchill's mandate to drive the Germans from Cyrenaica). After the Tiger Convoy arrived, the first task was to unload the vehicles and prepare them for combat – a task which took an inordinate amount of time. Indeed, it required about nine days just to unload all 238 tanks at Suez, then transfer them to the RAC depot at Abbassia. All the tanks needed to be painted in the three-tone Caunter scheme (light stone, silver grey and slate) and fitted with sand filters. Many of the tanks also arrived without vital equipment or required repairs to correct technical deficiencies. For example, many of the tanks lacked radios and there were only enough to provide one per troop.[98] In fact, none of Churchill's 'Tiger cubs' were delivered to troops until 21 May and the process continued for the next three weeks. Driver training and gunnery calibration were major issues, particularly on the unfamiliar Crusader tank, for which no technical documentation had been provided. Rather than wait for the personnel of the 1st Army Tank Brigade to arrive, it was decided to provide the new tanks to veteran units in the 7th Armoured Division. Both O'Carroll's 4 RTR and Jerram's 7 RTR were brought up to strength with Matilda II tanks, while the new Crusader tanks went to Harland's 6 RTR. The 5 RTR was provided with 33 Matilda IIs, and seven other tanks, but the unit did not finish re-equipping until 15 June. Clearly the RAC depot at Abbassia was hard-pressed to process large quantities of new tanks in mid-1941 and as a result, more than one-third of the tanks sent on the Tiger Convoy would not participate in the forthcoming offensive.

While the 7th Armoured Division was partially re-equipping, the WDF began detailed planning for Operation *Battleaxe*. The primary architects of the plan were Beresford-Peirse, Brigadier John Harding and Brigadier Alexander H. Gatehouse; although all had served in Operation *Compass*, only Gatehouse was an experienced armour officer.[99] The basic concept was to use an infantry division to recapture Halfaya Pass and the 7th Armoured Division to defeat enemy armour in the Fort Capuzzo-Sollum area. Information on the enemy's current dispositions in the frontier region was sketchy, but it was assumed that most of the Axis armour was deployed close to Tobruk, so the WDF expected to enjoy a numerical advantage on the opening day of the offensive. Given the shortage of transport and supplies, Wavell was under no illusions that *Battleaxe* would be able to lift the siege of Tobruk – unlike Churchill – but calculated that

Opening British attacks in Operation *Battleaxe*, 15 June 1941

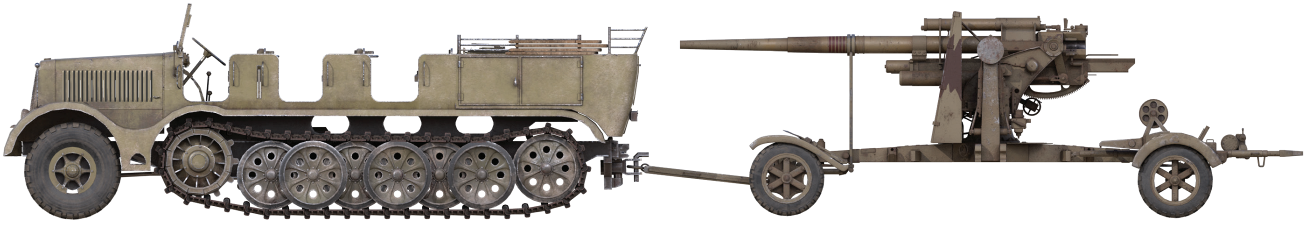


1. 0545 hours. Tank-infantry assault on lower end of Halfaya Pass is stopped by mines and anti-tank fire.
2. 0610 hours. An attack by C Squadron, 4 RTR, on the upper end of Halfaya Pass is defeated by 8.8cm fire.
3. 0940 hours. 2 RTR launches a hasty attack against the German strongpoint at Point 208, but is repulsed with heavy losses.
4. 1020 hours. Part of 4 RTR attacks the German strongpoint at Point 206, but due to inadequate infantry support, the position is not secured until nightfall.
5. 1130 hours. Panzer-Regiment 8 sends a single company to support the defenders at Point 206, resulting in a brief action against 4 RTR.
6. 1330 hours. 7 RTR attacks Fort Capuzzo without artillery or infantry support, requiring four hours to overcome the small Italian garrison.
7. Some elements of 4th Armoured Brigade advance to Musaid.
8. 1735 hours. Elements of Panzer-Regiment 5 arrive and skirmish with 6 RTR.
9. 6 RTR conducts another hasty assault on Point 208 which is repulsed with heavy losses.
10. 1830 hours. German armoured counterattack at Fort Capuzzo is repulsed.

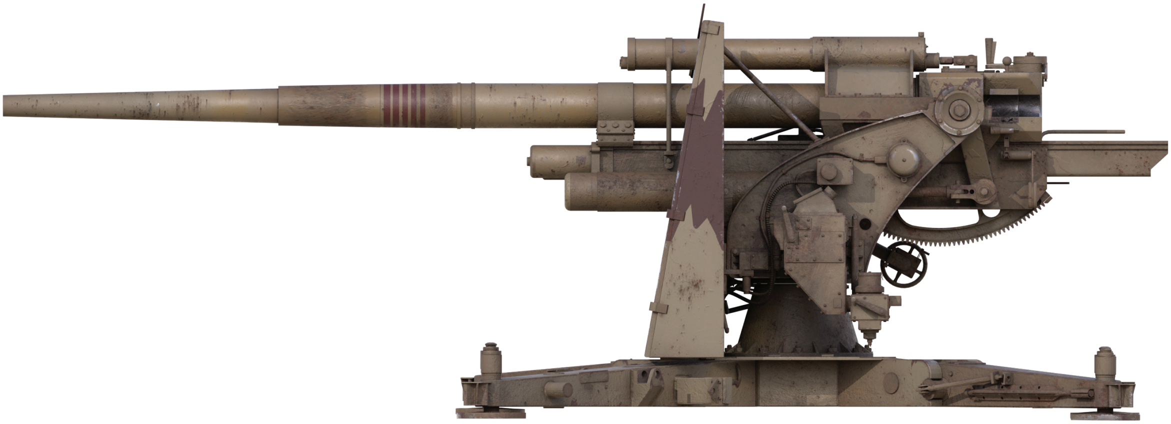
the elimination of the DAK covering forces would set the stage for a successful follow-on offensive. Wavell's planning process was immediately disrupted by Churchill's decision to invade Vichy-held Syria (Operation *Exporter*) in early June, which would require one brigade from the Indian 4th Infantry Division and two infantry brigades from the 7th Australian Division. Although no tanks were allocated for Operation *Exporter*, this concurrent operation reduced the amount of infantry for Operation *Battleaxe*.[100] It should go without saying that infantry tanks like the Matilda II were intended to work with infantry, not in an independent role. Once again, Britain's political leadership injected a simultaneous secondary mission to distract Middle East Command from the primary operation, as had occurred just three months prior with the Greek expedition. After deducting the forces required for Operation *Exporter*, Beresford-Peirse's WDF had two armoured brigades (with four armoured regiments), two infantry brigades (with six infantry battalions) and the 7th Armoured Division Support Group (with two motorized infantry battalions).

After the Tiger Convoy reached Suez, Churchill pressed Wavell to mount Operation *Battleaxe* as soon as possible. In a cable on 4 June, Churchill claimed that Wavell had '530,000 soldiers and 450 heavy tanks' in theatre and should be able to inflict a decisive defeat upon Rommel. Wavell tried to delay Operation *Battleaxe* in order to avoid a premature offensive, but Churchill continued to press.[101] The best that Wavell could achieve was to postpone the offensive for a week, in part to satisfy Major General Creagh's request for additional time to train his tank crews. Even this was not much of a respite because it took days to shift the slow-moving Matilda II tanks to their forward assembly areas. Lieutenant Colonel Roy M. Jerram's 7 RTR moved by rail to Mersah Matruh, but when the unit was de-training, a Matilda II ran over Jerram's foot, which removed one of the most experienced British tactical armour commanders before *Battleaxe* even started.[102] German aerial reconnaissance and SIGINT (signals intelligence) detected the British preparations and alerted Rommel on the evening of 14 June that a British offensive was imminent.[103]

The tactical organization for Operation *Battleaxe* was odd from the beginning, particularly because Creagh's 7th Armoured Division was split up and not allowed to operate under a single commander. Instead, Brigadier Alexander H. Gatehouse's 4th Armoured Brigade (4 RTR, 7 RTR) was assigned to Major General Frank W. Messervy's 4th Indian Division. Messervy was a classic India Army officer, with no experience with tanks or mechanized operations – certainly not the kind of officer to be entrusted with an armoured brigade. The rest of Creagh's 7th Armoured Division was left with the 7th Armoured Brigade (2 RTR, 6 RTR) and Gott's Support Group. The final *Battleaxe* plan specified that Messervy's division was the main effort, with the 11th Indian Brigade and 4 RTR assigned to capture Halfaya Pass, while 7 RTR and the 22nd Guards Brigade took Fort Capuzzo. The rest of Creagh's reduced-strength division was assigned to capture the Hafid Ridge west of Capuzzo, which was expected to prompt a response from any German armour in the vicinity. In addition to splitting up the 7th Armoured Division, the *Battleaxe* plan failed to provide much room for supporting arms such as artillery and engineers to contribute, even though it was clear that they would be needed to assault fortified positions. The WDF did possess ample artillery, with a total of 80 25-pdr guns and 16 6-inch howitzers allocated to the operation.



German 8.8cm Flak 18 being towed by its prime mover, a Sd. Kfz. 7 semi-track. (© Osprey Publishing Ltd, by Ian Palmer. From DUEL 109 *German 88mm Gun vs Allied Armour: North Africa 1941–43*)



German 8.8cm Flak 18 dual-purpose gun, the bane of Allied armour in North Africa. (© Osprey Publishing Ltd, by Ian Palmer. From DUEL 109 *German 88mm Gun vs Allied Armour: North Africa 1941–43*)

While Beresford-Peirse was assembling his WDF for the offensive, Rommel spent considerable effort trying to create a defence in depth to protect key positions along the frontier, each of which was designed with all-around defence in mind. The 15. Panzer-Division, now under Generalmajor Walter Neumann-Silkow, was assigned the covering force mission.[104] The Aufklärungs-Abteilung 33 was deployed well forward in the Egyptian desert to provide early warning to the main defensive line, which was anchored by *Stützpunkte* (strongpoints) at Halfaya Pass, Point 206 and Point 208. The *Stützpunkte* contained infantry, anti-tank guns and Flak guns (2cm and 8.8cm from I./Flak-Regiment 33), with the position at Halfaya being particularly strong. German *Pioniertruppen* laid Tellermines and dug in the 8.8cm Flak guns; all obstacles were covered by fire. The Italian 'Trento' motorized infantry division provided two infantry battalions and artillery to create additional fortified positions in Qalala, Sollum and Fort Cappuzo, further strengthening the defence. In order to counter any British attempt to outflank and isolate these forward positions, Oberstleutnant Hans Cramer's Pz.Regt. 8, with 82 operational tanks, was kept as a mobile reserve near Bardia.[105] The Axis defence of the frontier region in mid-June 1941 was the outcome of a judicious employment of combined arms resources, which integrated obstacles, fire support and manoeuvre elements in order to create lethal engagement areas. The only significant complication for the 15. Panzer-Division was the shortage of fuel – due to Allied interdiction of convoys reaching Tripoli – which reduced the operational mobility of the German armour.

The German 5.lei.Div. remained focused on Tobruk, but deployed its Pz.Regt. 5 and A.A. 3 in a position to move to support the 15. Panzer-Division if necessary. Pz.Regt. 5 received some replacement vehicles in early June, including 15 Pz III and five Pz IV medium tanks. Altogether, Pz.Regt. 5 had 96 operational tanks in mid-June (excluding Pz I and command tanks).[106] However, the leadership in Pz.Regt. 5 was in flux after Olbrich and Hohmann were both removed from command after the failed attacks on Tobruk, leaving Major Ernst Bolbrinker in temporary command.[107] Rommel had also succeeded in getting Streich relieved of command of the 5.lei.Div.

in late May. The new commander of the 5.lei.Div. was Generalmajor Johann von Ravenstein, a Prussian aristocratic officer of great experience. Like Rommel, von Ravenstein had been awarded the Pour le Mérite in the First World War for outstanding combat leadership of an infantry battalion. Unlike Rommel, he had been trained in the Großer Generalstab and was highly regarded within the upper echelons of the OKH. Between 1939 and 1940, von Ravenstein commanded a motorized infantry regiment in both the Polish and French campaigns and was experienced in manoeuvre warfare. However, von Ravenstein adapted poorly to the heat in North Africa and was initially out of sorts.

The Italian 'Ariete' Division, reinforced by a second medium tank battalion, probably had about 50 operational M13/40 tanks, but Rommel did not intend to use it in a manoeuvre battle. On paper, the DAK started *Battleaxe* with 178 operational tanks (excluding Pz I and command tanks), or about 53 per cent of the total armoured force deployed to North Africa in the past three months.

During the night of 14/15 June, the British moved forward 12 kilometres to occupy their assault positions. The opening move was made at dawn by the 11th Indian Brigade and part of the 4 RTR against the Axis position at Halfaya Pass; two converging columns were supposed to strike both ends of the pass moments after an artillery barrage. However, the artillery unit assigned to support the attack was not in place in time, so the attack went in without an artillery preparation. At 0545 hours, two troops with six Matilda II tanks from A Squadron, 4 RTR advanced against the foot of the pass, followed by two Indian infantry battalions. Moments later, four of the Matildas ran into a minefield on the coast road and were immobilized, while strong defensive fire kept the infantry at bay. The German Tellermine 35 was far more powerful than the Italian B2 anti-tank mines and the Matildas were badly damaged by the explosions (and later destroyed). On the high side of the escarpment, 4,500 metres to the south, Major Miles with his 12 Matildas from C Squadron 4 RTR paused, waiting for an artillery barrage that did not arrive. At 0600 hours, Miles finally decided to advance with his tanks deployed in a double extended line formation, with the Cameron Highlanders following well behind in trucks and carriers. The Matildas moved extremely slowly, about 12 kilometres per hour, which gave the thoroughly alerted defenders plenty of time to react. The battery of four 8.8cm Flak guns guarding the head of the pass opened fire at 2,000 metres, claiming one kill, but then ceased firing, probably because of hazy visibility conditions. Miles continued to advance, as per doctrine in ATI No. 2, hoping to get in range of the enemy guns, but the dug-in 8.8cm guns would have been very difficult for the British tanks to spot. Once the British Matildas were within 300 metres, the 8.8cm guns opened fire again, this time destroying 11 of C Squadron's 12 Matildas. After the British tanks were eliminated, the Axis garrison pounded the Cameron Highlanders with artillery fire, then counter-attacked with their reserve infantry company, taking 67 prisoners.[108]

The lack of effective aerial and ground reconnaissance to determine the enemy defences at Halfaya Pass are glaring errors in the preparation for the British attack. Despite the large British intelligence advantage gained from decryption of some German Enigma traffic in near real-time, British tactical intelligence-collection had sharply deteriorated from the heady days of Operation *Compass*. Knowledge of the arrival of 15. Panzer-Division in North Africa, while useful, was less useful on 15 June than knowing the exact location of enemy minefields and gun positions. In particular, it is clear that Aufklärungs-Abteilung 33 won the counter-reconnaissance battle by preventing units like 11th Hussars from getting close enough to identify German strongpoints prior to the offensive; the British armoured cars were skittish about the larger, better-armed German armoured cars and failed to take the kind of risks they had in 1940. Although the RAF claimed air superiority over the battlefield on 15 June, no effort was made to bomb the garrison of Halfaya Pass, even though Blenheims had been used in this role in Operation *Brevity*. Instead of massing the fires of several artillery battalions (including 6-inch howitzers) to support the main attack on Halfaya Pass, Messervy assigned only a token amount then failed to ensure that it was properly co-ordinated. Due to the rocky nature of the terrain atop the escarpment which inhibited digging in, the Axis artillery positions at Halfaya were quite vulnerable to concentrated barrages. Yet when one battery of 25-pdr guns got stuck in soft sand after crossing the line of departure, the whole fire support plan fell apart (and nobody in command realized this until too late). Likewise, negligible engineer assets were assigned to the attack to deal with mines and they were too far behind the tanks to provide any help. What should have been a textbook infantry-tank attack on Halfaya Pass failed miserably due to very amateurish mistakes.

Despite the faulty use of armour at Halfaya, it is worth noting that the poor state of infantry training in the WDF also played a major role in the failure of the attack. As occurred during *Brevity*, the British infantry proved hesitant and timid, unwilling to close with the enemy until the tanks had neutralized them. When this did not occur, the infantry was left stunned and inclined to retreat. Messervy, the career infantryman, should have recognized that Halfaya was a very exposed position and considered a night infantry attack with the Cameron Highlanders to degrade some of the defences before committing his armour. However, the British Army of mid-1941 was averse to considering night attacks and would not begin to regularly employ them until late 1942. Instead, the Cameron Highlanders and one Indian battalion lurked in the vicinity of Halfaya Pass for the next two days, but did not attempt to mount another major attack.

The rest of the opening British moves occurred after the primary attack on Halfaya Pass had already failed. Between 0910 and 1000 hours, the rest of 4 RTR, 7 RTR and 2 RTR crossed the frontier wire into Libya and headed toward their assigned objectives. At 1020 hours, Major I. A. D. Banks led nine Matildas from his A Squadron, 4 RTR against the Axis *Stützpunkte* at Point

206, a minor height located 8.5km west of Halfaya Pass. The German garrison in this position consisted of a company of infantry, a Panzerjäger detachment (with three 5cm Pak 38 and three 3.7cm Pak) and the I./Artillerie-Regiment 33 (with eight 10.5cm howitzers). Banks split his small squadron, sending one troop under Lieutenant Peter E. G. Lobb to attack Point 206 directly and the other two to attack an enemy position 4 kilometres to the north. Banks had effective artillery fire support, but no infantry support. The two troops in the north scored a major coup, overrunning the German artillery battalion, capturing its eight howitzers and over 100 personnel. However, Lobb's single platoon sent to attack Point 206 proved totally inadequate against dug-in anti-tank guns; two tanks were knocked out and the other broke down. Moving toward Point 206 to check on Lobb's progress, Banks' tank was immobilized by a 5cm hit on his engine. Banks tried to pull his unit together, but one Matilda simply disappeared and an unexpected contact with a group of German armoured vehicles from the north added to the confusion. By mid-afternoon, Banks only had two of his nine Matildas still operational and he had not captured his primary objective, so he requested help from 4 RTR's B Squadron, which was being held in reserve. Unfortunately, Messervy refused to allow this unit to be committed and instead Banks was ordered to make another attempt to capture Point 206.[109] A single company of infantry finally arrived at 1630 hours and Banks attacked with four tanks. The German anti-tank guns fired furiously and immobilized one Matilda, but the British tanks overran the position and destroyed the anti-tank guns, then moved off (the British infantry did not enter the objective). A frustrated Banks called for more artillery to silence the remaining enemy troops and Point 206 was finally secured by 2045 hours, with the 2nd Battalion Scots Guards taking 226 German prisoners.[110] While many accounts of *Battleaxe* point to the firepower of the 8.8cm Flak 18, none were at Point 206 and all the damage to Banks' tanks was inflicted by the less conspicuous 5cm Pak 38 gun.

Despite the British investment in creating CS tanks which could fire smoke rounds for obscuration, there appears to have been no attempt to incorporate them into the attacks on Halfaya Pass or Point 206. Indeed, the CS tanks at squadron and regimental level seem to have been held back from the action. The attack on Point 206 is interesting because it further demonstrates the dysfunctional nature of British attempts to mount combined arms attacks. At Halfaya, the tanks had plenty of infantry support, but virtually no artillery. At Point 206, it was the opposite, with plenty of artillery but negligible infantry support. It is also interesting that the British infantry expected the tanks to overrun and capture objectives before they would actually move onto the position to hold it, which was in line with the doctrinal strictures of ATI No. 2. Similar tactics had been used during Operation *Brevity*, with heavy tank casualties occurring before the infantry even reached the objective. Altogether, O'Carroll's 4 RTR lost 24 of its 44 Matilda II tanks on the first day of *Battleaxe* and only its uncommitted B Squadron was still mission-capable.

In the centre, Lieutenant Colonel Basil Groves' 7 RTR bypassed the fighting at Point 206 and headed for Fort Capuzzo, which it attacked at 1330 hours. The 153-man Italian garrison consisted of the 3rd Company of the 61º Reggimento Fanteria, reinforced with two 37mm Pak guns.[111] The British attack was conducted without artillery support and the infantry from the 22nd Guards Brigade was well behind. Groves deployed A and B squadrons on line and mounted a simple frontal attack, with 30 Matildas grinding forward at 12 kilometres per hour (about 200 metres per minute). Although there was very little defensive fire from the Italian garrison, the British tankers buttoned up and, without good visibility, several tanks collided just short of the objective. Nevertheless, the 7 RTR fought its way into the position and then split up to suppress resistance nests. However, the Italian infantrymen from the 'Trento' Division had begun training in close quarter combat against tanks (practising against M13/40 tanks), using Type L anti-tank grenades, Molotov cocktails and other improvised explosive devices.[112] Lacking infantry support and buttoned up, the British tanks proved highly vulnerable to infantry concealed in the ruins of the fort, who approached from behind and used their grenades to immobilize no less than five Matildas and damage several others.[113] This was an exemplary combat feat by any standards and one which caught the British tankers totally by surprise. Groves appealed to the 22nd Guards Brigade to send in infantry to support his tanks, but it took nearly an hour for the troops to arrive.

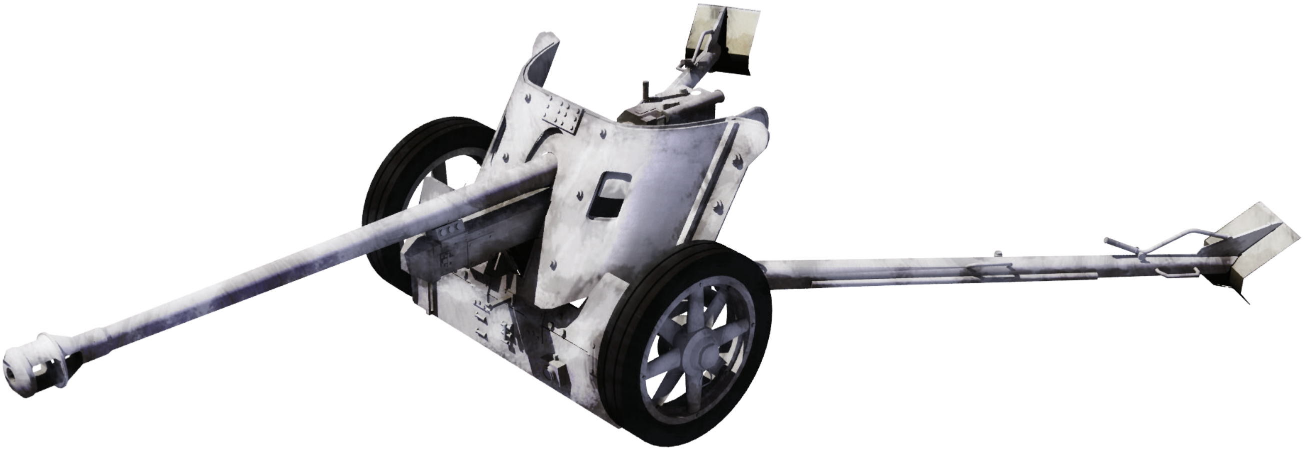
While 7 RTR was attacking Fort Capuzzo, the 7th Armoured Brigade was advancing toward Hafid Ridge (Point 208), a minor feature which lay 5 kilometres further west. After crossing the frontier wire, the 2 RTR was engaged by enemy artillery fire from the area of the ridge and at 0940 hours Lieutenant Colonel Chute ordered B Squadron (13 Mk IVA cruiser tanks) to immediately attack this position, without benefit of artillery support. The German position on Hafid Ridge was held by an infantry company, supported by Oberleutnant Ziemer's 3. Batterie (I./Flak-Regiment 33) of four 8.8cm Flak guns, one 5cm Pak 38 and three 3.7cm Pak. B Squadron 2 RTR attacked in a square formation, with two troops in front and two at the back. It is also important to note that Hafid Ridge had three separate crestlines, rather than just one. On the first attempt, B Squadron came under heavy fire as soon as it crested an intermediate ridge and the commander opted to break off. A second attack, reinforced by A Squadron and supported by one battery of 25-pdr guns from 4 RHA, commenced at 1145 hours.[114] Three of the four German 8.8cm Flak guns were oriented east and south, but the British approached from the west, cleverly using deadspace and the cover of blowing dust. Since the single 8.8cm was dug in to reduce its high silhouette, the gun barrel could not be depressed enough to hit the British tanks until they were within a few hundred metres. The 8.8cm Flak gun managed to destroy a single British Mk IVA cruiser, the tank commanded by Captain Victor D. C. York, but the other B Squadron tanks scattered the crew with coaxial machine-gun fire. Once the 8.8cm Flak

A convoy of Italian trucks on the Via Balbia near Derna passes an abandoned British A-9 cruiser tank. Rommel's advance was heavily dependent upon Italian motor transport to keep supplies moving forward from Tripoli. (Author's Collection)

was silenced, the British tanks quickly overran the western position, destroying one 3.7cm Pak and one 2cm Flak gun, but the crews hid in slit trenches. However, the German defenders 1,500 metres away on the eastern side of the ridge quickly re-oriented and began to fire upon B Squadron's exposed tanks. The B Squadron commander ordered a hasty withdrawal, but the loss of York's radio-equipped tank left five other tanks out of communication, so they did not receive this command and remained behind – all were soon destroyed.

Gott's Support Group played almost no role in the action at Hafid Ridge because it had been assigned a flank guard role. Three 'Jock Columns' were formed, each with a battery of 4 RHA and a company of infantry, which were used as screening forces. However, this division of assets meant that no infantry and precious little artillery was available to support the actual attack on Hafid Ridge. Nor were forward observer teams up front with the tanks, which meant that when the armour did request fire support, there was considerable delay and the amount of fire that eventually arrived was often inadequate.[115] Gott had enough 25-pdrs to suppress the 8.8cm Flak guns on Hafid Ridge and sufficient infantry to follow the tanks and consolidate on the objective – but he completely failed. A support group that does not provide timely support is not much of a support group – which was not recognized until after the culmination of *Battleaxe*.

While the British armour was assaulting the German forward covering line of *Stützpunkte*, Oberstleutnant Hans Cramer, commander of the mobile



The German 5cm Pak 38 was the standard anti-tank gun of the Afrika Korps. It was easy to conceal and packed a considerable punch, particularly when firing Tungsten-core APCR rounds. (© Osprey Publishing Ltd, by Ian Palmer. From DUEL 46 *Panzerjäger vs KV-1: Eastern Front 1941–43*)

reserve with Pz.Regt. 8, and Generalmajor Neumann-Silkow, commander of the 15. Panzer-Division, were trying to figure out what was going on. When defending against an armoured attack, you generally know that you have a serious problem when you lose radio contact with your forward positions. Based upon aerial reconnaissance and ground reporting, by 1100 hours Neumann-Silkow knew that British armour had overrun Point 206 and crossed the frontier wire, but Capuzzo and Point 208 were still in Axis hands. Rommel decided to remain at Tobruk and conduct the battle via wireless, in contrast to his normal lead-from-the-front style.[116] Although concerned that the British forces in Tobruk might attempt a simultaneous breakout, he decided to send a *Kampfgruppe* from Pz.Regt. 5 to reinforce the 15. Panzer-Division; these troops would not arrive until later in the day. New to command, Neumann-Silkow did not want to commit his Panzer reserve into an unclear situation, so he ordered Cramer to send a small force forward to support the frontier defences and help identify the enemy's main armoured spearhead; essentially, this was a movement to contact. Cramer opted to send a single Panzer company to check out the situation at Point 206 and this unit briefly skirmished with Banks' A Squadron 4 RTR around 1130 hours. Upon learning about British tanks near Capuzzo, Cramer committed another company (one of these companies was the 1. Panzer-Kompanie commanded by Oberleutnant Johannes Kümmel. German doctrine, although more flexible than British doctrine, clearly intended armour to be used in mass, not piecemeal, as Cramer did on 15 June.

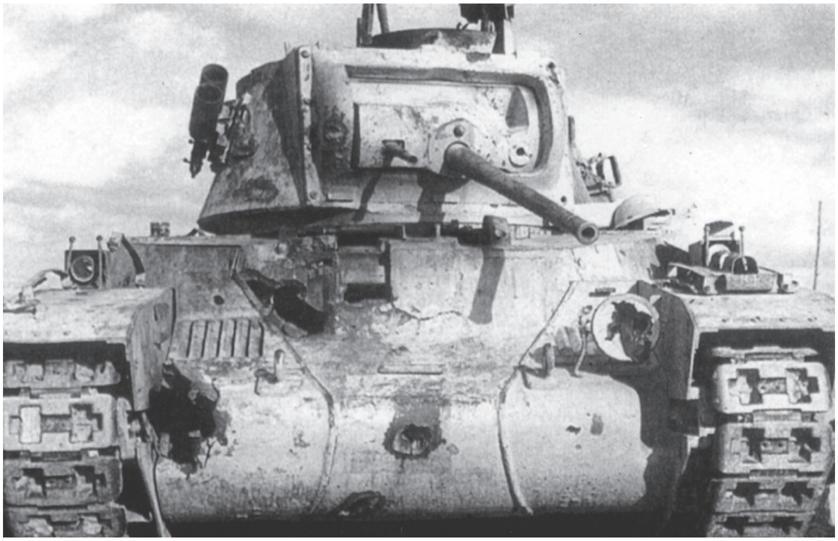
Around 1630 hours, elements of these two companies arrived near Capuzzo while 7 RTR was still dealing with the pesky Italian infantrymen. The German tanks and Matildas skirmished for a bit, but the German tanks retreated after two Pz IIIs were knocked out and the ammunition of the remainder was running low. Following this skirmish, the British infantry finally arrived (the Buffs and Coldstream Guards and forced the Italian infantry company to surrender; Capuzzo was declared secured by 1730 hours. Once the Germans learned about the fall of Capuzzo, Neumann-Silkow finally ordered Cramer to launch a full-scale counter-attack with all of the I./Pz. Regt. 8, but it took

In preparation for Operation *Battleaxe* in June 1941, the British began moving their armour closer to Halfaya Pass. Here, a Matilda tank is concealed in a hidden dug-out, just two days before the attack. (IWM, E 3532)

nearly two hours to bring all the scattered German tanks together. Around 1830 hours, Cramer's Panzers attacked from the north and west, apparently supported by Oberleutnant Theodor Schwabach's battery of 8.8cm Flak guns and some artillery. The 7 RTR took a bit of a pounding, with five Matildas knocked out, and the Germans kept the area under long-range fire until nightfall, but the German counter-attack failed to achieve its objective. Around 2130 hours, the 7 RTR left Capuzzo in the hands of the infantry and withdrew to a laager south of the fort, with at least 13 Matildas left on the battlefield. The costly tactical success at Capuzzo was a far cry from the heady days of December 1940, when 7 RTR could eliminate two Italian regimental groups at minimal cost.

While Cramer's Panzers and 7 RTR clashed near Capuzzo, the fight for Point 208 escalated as both sides committed additional forces late in the day. At least one company from the I./Pz.Regt. 5 appeared north of Point 208 late in the day and briefly engaged Lieutenant Colonel Harland's 6 RTR, which was waiting in reserve. After a time, German vehicles and guns appeared to withdraw from Hafid Ridge, which caused 7th Armoured Brigade to assess that the enemy was pulling back. At 1735 hours, Brigadier Russell ordered Harland's 6 RTR to conduct another assault on the ridge, from the south-west. Harland's battalion had been jerked around by brigade all day, moving here and there to no real purpose. Finally when ordered to attack, Harland pushed to get his tanks moving before the light began to fade. Brigade offered Harland artillery support, but he declined. Harland deployed Major H. W. H. Mill's A Squadron on the left and Major William I. Miller's B Squadron on the right. Oddly, Mills' squadron advanced on line, while Miller's squadron advanced in a broad wedge. Miller's squadron crested a small elevation and immediately came under fire from 8.8cm guns that were no more than 500 metres away. Six of the Crusader tanks were destroyed in the initial moments and two more soon afterward. Major Miller was killed and the remaining British tanks turned and retreated. The Germans on Hafid Ridge continued to harass the 6 RTR with long-range fire until darkness fell. In the aftermath of this failed attack, Lieutenant Colonel Harland, who had been a tanker since 1918, was relieved of command.

By the end of 15 June, neither side could claim any real success. Although the British had failed to take Halfaya Pass, they still had sufficient strength remaining to accomplish this task. British tank losses were heavy – about 56 tanks destroyed or badly damaged – but 7th Armoured Division still had about 85 operational tanks. The British had succeeded in eliminating a good portion of the German frontier defences, which worried the German commanders. While the German Panzer reserve was nearly intact and even reinforced by the I./Pz.Regt. 5, it had failed to prevent the loss of the forward positions. Cramer spent most of the day committing the reserve piecemeal, then launched a poorly organized battalion-size counter-attack that failed to achieve anything.



A British Matilda lost during Operation *Battleaxe*, which shattered the reputation of this tank. Even the thick frontal armour on the Matilda could not withstand direct hits from 8.8cm AP rounds. (Author's Collection)

During the night of 15/16 June, both sides repaired damaged tanks and prepared to resume the battle at dawn. Rommel intended to commit the 15. Panzer-Division's Panzergruppe in a fixing attack at Fort Capuzzo, while swinging the *Kampfgruppe* from 5.lei.Div around the west side of Hafid Ridge to strike the British in the flank. On paper, this sounded like a clever plan, but the German forces available proved inadequate to accomplish these tasks. Just before dawn, Cramer launched his attack against Capuzzo with about 50 tanks from Pz.Regt. 8, supported by Schwabach's 8.8cm Flak battery. The British 22nd Guards Brigade had dug in around Capuzzo with two infantry battalions and the 65th Anti-tank Regiment (a TA unit), with 7 RTR in support. Cramer conducted a virtually tank-pure attack – again in violation of German doctrine – without significant artillery or infantry support. Cramer also made the mistake of attacking in column, instead of wedge or line, which increased the probability of enemy rounds striking targets. The 7 RTR Matildas, occupying hull-down positions, opened fire first, followed soon thereafter by the 2-pdr anti-tank guns and 25-pdr guns. Cramer's Panzers suffered badly from the British fire, but he tried to use the 75mm howitzers on his Pz IV tanks to suppress the enemy anti-tank guns. Schwabach's 8.8cm Flak guns also managed to hit a few Matildas, but British 25-pdrs succeeded in damaging three of his guns. British artillery pounded the exposed German tanks and Cramer was badly wounded when his command Panzer was knocked out.[117] Eventually, two batteries from Artillerie-Regt. 33 arrived and provided Cramer's Panzers with some fire support, although the action had already devolved into a slugfest. After five hours of fruitless fighting, Pz.Regt. 8 finally broke off the action and withdrew, having failed to re-capture Capuzzo. The German 15. Panzer-Division had lost the bulk of its armour – at least 36 tanks destroyed or put out of action – and Pz.Regt. 8 was left with only 15 operational tanks (eight Pz II, one Pz III and six Pz IV). Adding insult to injury, while the German armour was busy at Capuzzo, the British sent the 2nd Battalion Scots

A detachment from Pz.jg.-Abt. (Sfl) 605 occupies hull-down positions below the crest of a large dune in the Libyan desert, early 1941. Generally, it was best for armoured vehicles to avoid these kind of soft sand traps. (Author's Collection)

Guards to eliminate the Italian positions in Musaid and Sollum, thereby completely isolating the German garrison at Halfaya Pass.

Meanwhile, von Ravenstein's 5.lei.-Div tried an end-run around Hafid Ridge with about 40–50 tanks from Pz.Regt. 5 and A.A. 3, but ran into trouble against the 7th Armoured Brigade, which had 49 tanks left. The initial fighting, which began south of Hafid Ridge around 0910 hours, seemed to favour the German tanks. Certainly the cruiser tanks had no advantage over the German Pz III and Pz IV tanks and three cruisers were knocked out in the initial skirmishing. The 2 RTR and 6 RTR did not cooperate well due to communications issues, which prevented them from working together against Pz.Regt. 5. Around noon, the British pulled back toward the frontier wire to refuel, but the German tanks followed and attacked again. In a third German attack at dusk, Lieutenant Colonel Chute, commander of the 2 RTR, was wounded. Although 7th Armoured Brigade was reduced to just 24 operational tanks, Pz.Regt. 5 was prevented from getting around behind the British and had suffered about a dozen tanks knocked out. Thus, the second day of *Battleaxe* ended as another draw, although the British had accomplished some of their objectives whereas the Germans had accomplished none of theirs.

During the night of 16/17 June, Rommel ordered Neumann-Silkow to pull the badly depleted Pz.Regt. 8 out of the fight at Capuzzo and move it south-west, beside von Ravenstein's 5.lei.-Div. With both divisions on line, Rommel intended to push in the British left flank and then push toward Sidi Suleiman, then threaten the British line of communications; this was a classic 19th-century Jomini-style approach to warfare,[118] but far less decisive than the *Kesselschlacht* (cauldron battles) that most of the Panzerwaffe had adopted. In any case, at 0600 hours on 17 June, the 5.lei.-Div. began advancing eastward toward Sidi Suleiman while the 15. Panzer-Division advanced toward Point 206. After a brief fight, the 7th Armoured Brigade and the Support Group (which had been barely engaged throughout *Battleaxe*) began a fighting delay eastward. Resupply of ammunition had not occurred during the night, leaving 7th Armoured Brigade desperately short of 2-pdr ammunition at a critical moment. Both the 2 RTR and 6 RTR were forced to abandon a total of 28 damaged tanks, which they did not have time to destroy. The 4 RTR put up a particularly stiff rearguard action near Point 206, with its still intact B Squadron under Major Ivor T. Clement. By 0900 hours, Pz.Regt. 5 had reached Sidi Suleiman and German tanks were sighted within 2 kilometres of Messervy's division command post (CP). Gatehouse verbally ordered Clement to stop this German tank advance and the 12 Matildas of B Squadron 4 RTR immediately launched a counter-attack. Major Clement succeeded in saving Messervy's CP, but he was killed in the action and his squadron mauled. Major John R. Holden's composite squadron from the 7 RTR also helped to slow the German advance. Nevertheless, Messervy decided to order his division to withdraw, fearing that German tanks would envelop and cut off his infantry – exactly the response Rommel was hoping to elicit. Messervy acted at a moment when British communications were chaotic and by the time that

Beresford-Peirse learned of the withdrawal around 1000 hours, it was already in progress. Messervy also blocked an attempt by Creagh to unite the remaining tanks of 4th and 7th armoured brigades in order to stop the German Panzers by claiming that his infantry needed 4 RTR and 7 RTR to cover their withdrawal. In any case, by 1030 hours most of the WDF was falling back.

Although Rommel was able to convince the WDF to withdraw by threatening to envelop their flank, his Panzers failed to catch and destroy any significant Commonwealth units. Indeed, the German pursuit in the final hours of *Battleaxe* was overly cautious and mostly concerned with linking up with the garrison at Halfaya Pass. Although tank skirmishing continued until about 1800 hours, the British slowly withdrew to the south-east and the German tanks, low on fuel, did not press the pursuit. Rommel did not arrive on the battlefield until late on 18 June, after the fighting was over. He reported to the OKH that the DAK had destroyed 200–250 British tanks, indicating his tendency to exaggerate his accomplishments.[119] Rommel also blamed both Neumann-Silkow and von Ravenstein for failing to cut off the retreating 22nd Guards Brigade, which again was not indicative of the atmosphere one associates with a victory. In any case, the OKH in Berlin was not interested in *Battleaxe* because Operation *Barbarossa*, the invasion of the Soviet Union, was about to commence in three days.

The standard historiography of Operation *Battleaxe* has typically treated the three-day battle as something of a fiasco for the British, which ended in a German operational-level victory. Furthermore, the battle is often depicted as the swan song of the Matilda II infantry tank due to the demonstrated lethality of the 8.8cm Flak gun. However, this version of *Battleaxe* really does not stand up well against the available facts, which are admittedly difficult to ascertain because of the nature of available British and German sources. In material terms, the British lost 98 tanks (65 Matilda, 16 Crusader, 14 other cruisers and three light tanks), out of a starting force of about 215 tanks – roughly 45 per cent tank losses. Few accounts notice that the British succeeded in evacuating many of their damaged tanks from the battlefield during *Battleaxe*, including most of the damaged Crusaders. It is also important to remember that not all the tanks that arrived in the Tiger Convoy were used in *Battleaxe* (e.g. only 92 of 135 Matildas that came in the convoy) and that units like 5 RTR had been left out of the battle. As a result, the 7th Armoured Division still had significant residual combat capability. Furthermore, the divisional support group had suffered minimal losses during *Battleaxe*. In terms of human losses, the 7th Armoured Division losses were relatively light, although the death of three veteran squadron commanders (Clement, Miles, Miller) was painful. The hard-hit 4 RTR lost 13 killed and 57 wounded or missing, roughly one-third of its tank crews.[120] The 6 RTR suffered 53 casualties, including 16 killed.

Most sources claim that the Germans lost only 12 tanks destroyed (*Totalausfälle*) by enemy action during *Battleaxe*, namely five Pz II, six Pz III and one Pz IV. German records break down their tank losses into three

A section of universal carriers observe activity near Fort Capuzzo during Operation *Battleaxe*. The carrier was ill-suited either as a command vehicle or to transport mechanized infantry, in contrast to the German half-tracks. (Author's Collection)

categories: totally destroyed, damaged but repairable within less than two weeks and those not repairable in two weeks (which could mean never, if they were cannibalized for parts).[121] On the day after *Battleaxe* ended, the Germans reported 98 tanks operational (excluding Pz I and unarmed command tanks) out of a total starting strength of 178 tanks in both divisions, ergo they lost 55 per cent of their tanks to enemy action or mechanical failure. Obviously, the Germans retained control over the battlefield and could recover and repair their damaged vehicles – if they had the spare parts. While the DAK still had a credible Panzer force after *Battleaxe*, it had suffered heavy losses which could not easily be replaced. In human losses, several Panzer leaders were wounded in combat (Cramer, Bolbrinker), but crew losses are unknown. Pz.Regt. 5, which reported only four tanks Totalausfälle, had eight crewmen killed during *Battleaxe*. Overall, the Axis forces suffered higher casualties than the Commonwealth forces, including nearly 600 Italian casualties.[122]

It is important to balance losses against what was accomplished. In less than two days, the WDF eliminated most of the DAK's covering forces, except for Halfaya Pass and Point 208 – this amounted to about two mixed Axis battalions. Operation *Battleaxe* was intended to set the stage for a better-prepared follow-on operation to raise the siege of Tobruk, which had nearly been realized in the first two days of the operation. With the German garrison in Halfaya Pass isolated and running low on ammunition and water, the battle was still undecided until Messervy decided on his own to initiate a hasty retreat – a retreat which also prevented the 7th Armoured Division from recovering many of their damaged tanks. The British had also intended to degrade Rommel's Panzer reserves, and the heavy losses inflicted on Pz.Regt. 8 certainly served that purpose. On the other hand, the performance of Pz.

German mechanized warfare doctrine was heavily reliant on tactical air support, particularly aircraft like the Ju-87 Stuka. (Author's Collection)

Regt. 8 was sub-par through most of the battle and it failed in its primary mission to support the covering force positions or defeat a British armoured attack. Indeed, it is striking how many of the tank versus tank actions during *Battleaxe* were indecisive, leading to limited losses and no real shift in tactical advantage. It is also noticeable that German tank gunnery was rather poor during *Battleaxe*, with units running out of ammunition even though they had hit few enemy tanks. However, the Third Reich's propaganda arm took over and glossed over the mediocre performance of Pz.Regt. 8 at Capuzzo by elevating Oberleutnant Johannes Kümmel, commander of 1. Kompanie, to hero status. Kümmel was dubbed 'der Löwe von Capuzzo' (the Lion of Capuzzo) for supposedly destroying 11 Matilda tanks and soon awarded the Ritterkreuz des Eisernen Kreuzes for this feat. While Kümmel was no doubt a capable Panzer officer, the German tanks at Capuzzo only accounted for a small number of British tanks and it is unlikely that one company commander was responsible for most of them. By spotlighting Kümmel, it kept the OKH from asking too many questions about why 15. Panzer-Division made so many doctrinal mistakes in handling its Panzer reserve.

The exaggerated claims made by German propaganda about the performance of the 8.8cm Flak guns during *Battleaxe* has also been accepted too much at face value. It is clear from British accounts that the 8.8cm guns achieved most of their success at ranges of just 300–600 metres, particularly in the 20 'kills' against C Squadron 4 RTR and B Squadron 6 RTR. After the battle, the Germans claimed that the three batteries of I./Flak-Regiment 33 fired a total of 1,680 rounds of 8.8cm ammunition and destroyed 79 British tanks, or 21 rounds per victim.[123] In effect, the Luftwaffe gunners claimed to have accounted for 80 per cent of the British tank losses during *Battleaxe*, even though close examination of British accounts suggests that fewer than half the casualties were due to 8.8cm fire. There is little doubt that the unheralded 5cm

Pak 38 gunners from Panzerjäger Abteilung 33 destroyed a significant number of British tanks, particularly in the fighting at Point 206 where there were no 8.8cm guns involved. Furthermore, while some British tanks were destroyed by 8.8cm Flak guns at ranges over 1,000 metres, this was the exception. Rommel personally picked two enlisted soldiers who served as Flak gunners at Point 208 – Hübner and Heintze – to receive the Ritterkreuz des Eisernen Kreuzes, which helped to outsize the role of the 8.8cm guns in defeating *Battleaxe*. Nor was the Matilda II made obsolete by the 8.8cm Flak gun, since German tankers continued to treat it with respect due to the difficulty of penetrating its thick armour with their short-barrelled 5cm guns.

Rather than Rommel and his DAK defeating the WDF in *Battleaxe*, a sober post-mortem analysis, bereft of propaganda embellishments, should reveal the real causes of the operation's ultimate failure. Essentially, *Battleaxe* was a three-day battle of attrition and both sides suffered significant damage, but it was the British who blinked first. Front and centre, Messervy's inept handling of 4th Armoured Brigade, inability to reduce the Halfaya garrison and poor handling of his available fire support assets were the proximate cause of heavy British tank losses, both in the attack and during the withdrawal. British tactical communications were problematic throughout the battle, which greatly undermined effective command and control, but Beresford-Peirse's passivity allowed the situation to slowly unravel. Rommel constantly hounded his commanders to keep counter-attacking, per German doctrine, whereas Beresford-Peirse lacked the ruthless edge to force Messervy to keep attacking at Halfaya. Nor is it clear why Beresford-Peirse allowed Messervy to retain control over 4th Armoured Brigade after the failed attack on Halfaya, instead of transferring it back to 7th Armoured Division. With only a single armoured brigade under his command, Creagh was handicapped throughout the battle in trying to stand up to the two German armoured divisions. Nor did the WDF exploit its large superiority in artillery fire support during *Battleaxe*; Messervy committed his artillery in driblets while Jock Campbell was allowed to split up the 4 RHA into four detachments, thereby minimizing the available fire support to 7th Armoured Brigade on Hafid Ridge.

While a rushed operation such as *Battleaxe* had less than optimal chances for achieving an operational-level success, the WDF did have the resources and experience to achieve at least a tactical victory. The fact that *Battleaxe* ended as it did was no reflection on the skill or valour of the British tankers, who fought quite well and were able to engage their opposite numbers with confidence. Instead, it was the British mid-level leaders who lacked the kind of aggressive determination that O'Connor had shown in 1940. Despite their 'success' in stopping *Battleaxe*, Rommel's DAK was in a worse situation afterwards, with fewer tanks, even fewer fuel reserves and still stuck in a deadlocked siege at Tobruk, unable to move forward or backward. Nor did the British setback shift the strategic initiative to Rommel, which normally occurs as the result of a victory. Instead, Rommel found himself in exactly the same position as before and also had to reconstitute his frontier covering forces, which had been badly

A German Pz III crew enjoys a break after the victories in May–June 1941. Despite failure at Tobruk, the Afrika Korps was beginning to develop an *esprit* that would weld it into a formidable combat force. (Author's Collection)

depleted by *Battleaxe*. Aside from the addition of a dozen captured British tanks to their inventory, the DAK had little to boast about.

In London, Churchill was apoplectic about the failure of *Battleaxe*. Four days after the offensive ended, Wavell was unceremoniously relieved of command.[124] General Claude Auchinleck was appointed to replace Wavell as theatre commander in the Middle East. Auchinleck was a classic India Army officer, having spent virtually his entire military career in the region; he was an infantryman to the core, but his combat experience was against Turks and north-west tribes, not German regular troops. In terms of leadership style, Auchinleck was idiosyncratic and aloof, ill-suited to the task of building a team spirit among the varied Commonwealth forces in the Middle East. Nor did he have any first-hand experience with tanks and mechanized operations and had not really commanded any formation larger than an infantry brigade (a brief experience in the Norwegian campaign notwithstanding).[125] Lacking this experience, Auchinleck also proved to be at a loss in selecting the best officers to lead the Commonwealth formations that would fight in North Africa, leading to a rather haphazard list of commanders over the next year.

One positive outcome of *Battleaxe* for the British was that it caused the War Office to accelerate the development of a 6-pdr gun (57mm) for a new version of the Crusader tank, in order to match the German 5cm gun. However, mounting the 6-pdr gun in the sloped Crusader turret was a challenge that would require significant trade-offs, including reduction of one crew member (the loader). Due to these developmental challenges, the War Office did not expect any British tanks to be equipped with a 6-pdr gun until mid-1942.[126]

CHAPTER 5

THE CLASH OF ARMOUR

PANZERGRUPPE AFRIKA AND EIGHTH ARMY, AUGUST–SEPTEMBER 1941

> *'The terrain was so different from that of East Africa. The desert was all the same and just nothing, with navigation as if you were at sea.'*[1]
>
> *Lieutenant General Sir Alan Cunningham, September 1941*

Following Operation *Battleaxe*, both sides went into a period of reconsolidation and reorganization to prepare for future operations. Tobruk remained under loose siege, but Rommel launched no further major attacks against the fortress. Pre-occupied with the invasion of Russia, the OKH hoped that Rommel could reduce Tobruk before the end of 1941, but did not expect to resume any large-scale offensive operations in North Africa until early 1942. For the Germans, the North African theatre was now a sideshow to the main event. Rommel was promoted to General der Panzertruppe in July and a new command structure, Panzergruppe Afrika, began forming in August and was formally established on 1 September. Generalmajor Alfred Gause became chief of staff of Panzergruppe Afrika and his retinue included Oberstleutnant Siegfried Westphal as operations officer (Ia) and Major Friedrich von Mellenthin as intelligence officer (Ic).[2] Rommel would now have an experienced, professional staff to plan operations. Initially, the Panzergruppe consisted of just the two German

The 8th Army received its first Valentine (Infantry Tank Mk III) in July 1941. Essentially, the Valentine was a smaller, cheaper tank than the Matilda but with similar armoured protection and 2-pdr gun. The Valentine's main virtues was that it was more mechanically reliable and could be mass produced. (IWM, KID 863)

mechanized divisions in the DAK, the Italian infantry division 'Savona' and a few assorted support units. Although Rommel requested additional reinforcements – equivalent to another Panzer division – the OKH rejected this request and informed him that he should expect no major German reinforcements for the time being.[3]

When Rommel moved up to command Panzergruppe Afrika, Generalleutnant Ludwig Crüwell was flown in to take command of the DAK. Crüwell, a cavalry officer with General Staff training, had a wealth of command experience in armoured warfare. In 1938, he had commanded a Panzer regiment, then moved up to command the 11. Panzer-Division in the Balkan campaign and the initial stages of Operation *Barbarossa* in the Ukraine (including a key role in the Battle of Brody in June 1941). Crüwell was a superb choice to lead German armour in North Africa. Before Crüwell arrived in North Africa, the 5.lei.Div was re-organized as the 21. Panzer-Division, by adding one infantry battalion from 15. Panzer-Division and two artillery battalions. For the next year, the armoured backbone of the DAK would consist of these two Panzer divisions. Rommel also pleaded for more German infantry to create a new covering force in the Bardia-Sollum-Halfaya triangle and the OKH agreed to establish a new formation, Divisionskommando z.b.V. Afrika, but it did not begin deploying to North Africa until late September.[4]

Rommel at Tobruk, mid-1941. He under-estimated the British willingness to hold the fortress and recklessly committed his armour into an improvised attack with little consideration for terrain or the defences. (Author's Collection)

In terms of equipment, the DAK's two Panzer divisions were gradually rebuilt to nearly their original strength at the start of the Libyan campaign. However, it is important to note that one-third of the German tank strength was still composed of Pz II light tanks armed with the 2cm gun or unarmed command tanks (Pz. Bef.); these vehicles could not go toe-to-toe with British tanks. Furthermore, while the Pz III and Pz IV medium tanks could engage the British cruiser tanks with confidence, their short-barrelled 5cm guns and 7.5cm howitzers were inadequate to defeat large numbers of enemy infantry tanks. Even with the 5cm Panzergranate 40 APCR (tungsten-core) – which was in short supply – the Pz III Ausf G could only defeat the Matilda at ranges of 500 metres or less. In August 1941, about 6 per cent of all 5cm rounds produced for the Pz III were APCR and a typical load in combat was about five rounds of Panzergranate 40.[5] In order to increase their ability to resist the standard 2-pdr armour-piercing (AP) rounds, the Heereswaffenamt had initiated an upgrade programme for the Pz III medium tank in late 1940, which resulted in introduction of the Pz III Ausf H model, equipped with 30mm thick bolt-on face-hardened armour (FHA) steel plates (*zusatzpanzerung*) on the hull front and rear (resulting in a combined thickness of 60mm).[6] Unlike standard rolled homogenous armour (RHA), FHA is also more likely to reduce penetrations from direct hits. Thus, the British 2-pdr AP rounds could not penetrate the frontal or rear hull armour on the Pz III Ausf H, although the side armour remained at 30mm thickness. Fortunately for the 8th Army, the Pz III Ausf H model was relatively rare in North Africa and many of the DAK's panzers were the less well-protected Pz III Ausf F and G models. The Pz IV Ausf E model received 20mm-thick bolt-on plates, but was still vulnerable to 2-pdr fire at normal battlefield ranges.

Thus even at full strength, Rommel's Panzer units in 1941 still had to be careful to avoid heavy casualties when engaging British infantry tanks. The arrival of more long-barrelled 5cm Pak 38 anti-tank guns did help, although the prime movers for these weapons could be quite vulnerable on the battlefield. The DAK also had two Luftwaffe Flak battalions equipped with 8.8cm guns, although they were best suited to defensive situations. As for Rommel's infantry, they lacked the ability to conduct large-scale operations over desert terrain, since they were provided very few halftracks (only one company in the 15. Panzer-Division was mounted in SdKfz 251/1 halftracks) or four-wheel drive trucks. The wheeled transport of the division supply columns were even less suited to long marches over desert terrain. Consequently, the shortage of suitable off-road transport undermined the ability of the DAK to conduct combined arms manoeuvre warfare in the style promoted by contemporary Wehrmacht doctrine.

During the summer of 1941, the Italians were also engaged in re-organizing and reinforcing their forces in North Africa. In July, Gariboldi was replaced as theatre commander (*superasi*) by Generale Ettore Bastico, who had led the CTV in Spain in 1937. Although the 'Ariete' Division had not seen heavy combat in the initial campaign in Libya in the first half of 1941, Rommel had scattered it hither and yon into small detachments, resulting in great wear and tear on men and machines. However, the Comando Supremo ensured that the 'Ariete' Division was gradually reinforced with three medium tank battalions (a total of 146 M13/40 tanks), more artillery and its motorized infantry restored with replacements. In addition, the Comando Supremo modified the structure of the medium tank battalions, expanding their structure to three tank companies, each with three platoons of five tanks (which added up to 52 M13/40 per battalion, instead of 37 as in the original 1940 organization). By October 1941, the 'Ariete' Division would have 141 M13/40 operational tanks (plus about 50 non-operational) and 950 trucks (66 per cent operational).[7] The Italian Army established a tank depot at Derna to serve as a focal point for repairs and training new crews, with a forward repair workshop set up at Gazala and another closer to Tobruk.[8]

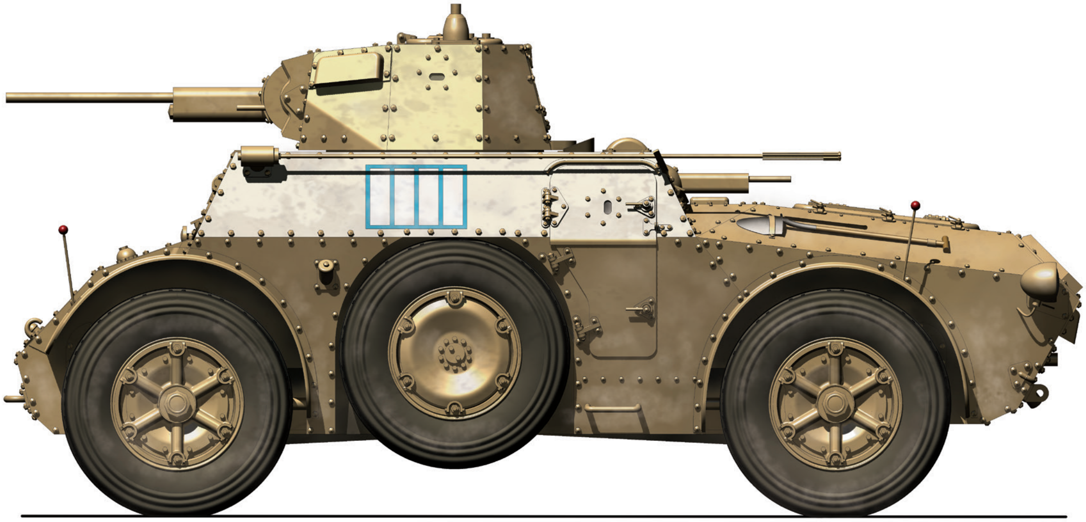
Early on, the 8th Army developed a preference for employing its 2-pdr anti-tank guns mounted portee, on the back of light trucks. While portee guns could rush quickly to engage an enemy armoured breakthrough, they proved highly vulnerable to return fire. (Author's Collection)

Bastico also ensured that the 'Ariete' Division was given the time and resources to train its tank crews. Both ammunition and fuel were limited, which allowed crews to only fire 5–8 rounds of 47mm in practice. Although driver and gunnery training was still rudimentary by German or British standards, the long respite after *Battleaxe* afforded Italian tank crews a chance to assimilate replacements and improve basic skills. Furthermore, more M13/40 tanks now began to receive RF1CA radios and each tank battalion was provided with two M13/40CR (Centro Radio) command tanks; these improvements enabled Italian armour to operate on a larger scale and cooperate better with other arms. Consequently, the larger, better-trained and -equipped Italian armoured battalions of late 1941 had far more combat capability than the ad hoc formations O'Connor has smashed with relative ease in 1940. In addition to the 'Ariete' Division, Bastico ensured that the 'Trieste' motorized infantry division was reinforced and brought up to strength. The 'Trieste' Division was provided with nearly 1,200 motor vehicles (96 per cent operational), which gave its battalions much greater mobility than most infantry formations serving in North Africa. One of the few areas where the Italians held a real technical edge over the Germans was in all-terrain trucks adapted for African service, such as the Breda SPA35 Dovunque and the improved diesel-powered SPA41. In contrast, most of the DAK's motor vehicles possessed neither diesel engines nor four-wheeled drive; in 15. Panzer-Division less than 5 per cent of the trucks were capable of moving across desert terrain and in the 21. Panzer-Division it was about 18 per cent.[9] It is also important to recognize that the DAK was heavily dependent upon the Italian forces for logistic support in North Africa, particularly the thousands of trucks hauling fuel, water and ammunition from Tripoli to the front.

On 15 August, Bastico established the Corpo d'Armata di Manovra (CAM or Corps of Manoeuvre) under Generale Gastone Gambara. The CAM consisted of the 'Ariete' and 'Trieste' divisions (with a total of nearly 24,000 troops) and it was a conscious effort to create a corps-size formation that was capable of independent operational-level manoeuvre warfare.[10] Unlike earlier operations, Italian armour was no longer to be tied to non-motorized infantry units. In many respects, the establishment of the CAM indicates that Italian thinking on armoured operations was evolving rapidly based on their experience in North Africa. A further indication of this evolution was the creation of the Raggruppamento Esplorante del Corpo d'Armata di Manovra (RECAM), a special reconnaissance group for the CAM. The RECAM was a mixed group, which included armoured cars, a few tanks and tankettes, motorized infantry and motorized artillery; it was exactly the kind of mobile covering force required to act as the eyes and ears of the CAM.[11] The RECAM was also provided with small numbers of new armoured fighting vehicles, including a platoon of L6/40 light tanks (armed with 20mm guns) and a few AB41 armoured cars (also armed with 20mm guns).

Yet one area that remained problematic for the Italian units in North Africa was anti-tank weaponry, since the standard 47/32 anti-tank guns could not defeat the thickly armoured British infantry tanks. The Germans partly plugged this gap by providing some 8.8cm Flak guns (who referred to this weapon as the 88/55) and ex-Czech 75/50 guns to the Italians, although the Italians had no halftracks to tow these heavy guns around the battlefield. As a local improvisation, the Italian Army took seven 102/35 Model 1914 naval guns and mounted them on Fiat 634 trucks. While these improvised tank destroyers were large, clumsy vehicles, they did have the ability to fire a 15kg armour-piercing shell which could defeat a Matilda II at a kilometre or more (the 8.8cm typically fired a 10kg Panzergranate 39 AP round). Two batteries of these tank destroyers were assigned to the RECAM.

On the other side of the desert, the Commonwealth forces were also using the respite to reorganize. In the immediate aftermath of *Battleaxe*, Auchinleck decided not to make any immediate command or structural changes with the Western Desert Force. Instead, Auchinleck focused on restoring the WDF's combat capabilities, which was assisted by the arrival in early July of over 120 new tanks from Britain, including the first 36 Infantry Tank Mk. III or Valentines. In tactical terms, the 17-ton Valentine offered no real advantage over the 25-ton Matilda II, since it was armed with the same 2-pdr gun and possessed the same mobility limitations. The Valentine also had a very cramped turret interior and a three-man crew, unlike the Matilda's four-man crew, which meant the commander on an Infantry Tank Mk III had to load the 2-pdr gun on his own. While the Valentine had thinner armour than the Matilda, it was still well protected by the standards of 1941 and its reduced height made it a smaller target. Yet the Valentine's chief advantage lay in the



The Italian AB41 armoured car entered service in early 1941. (© Osprey Publishing Ltd, by Henry Morshead. From NVG 261 *Italian Armoured & Reconnaissance Cars 1911–45*)

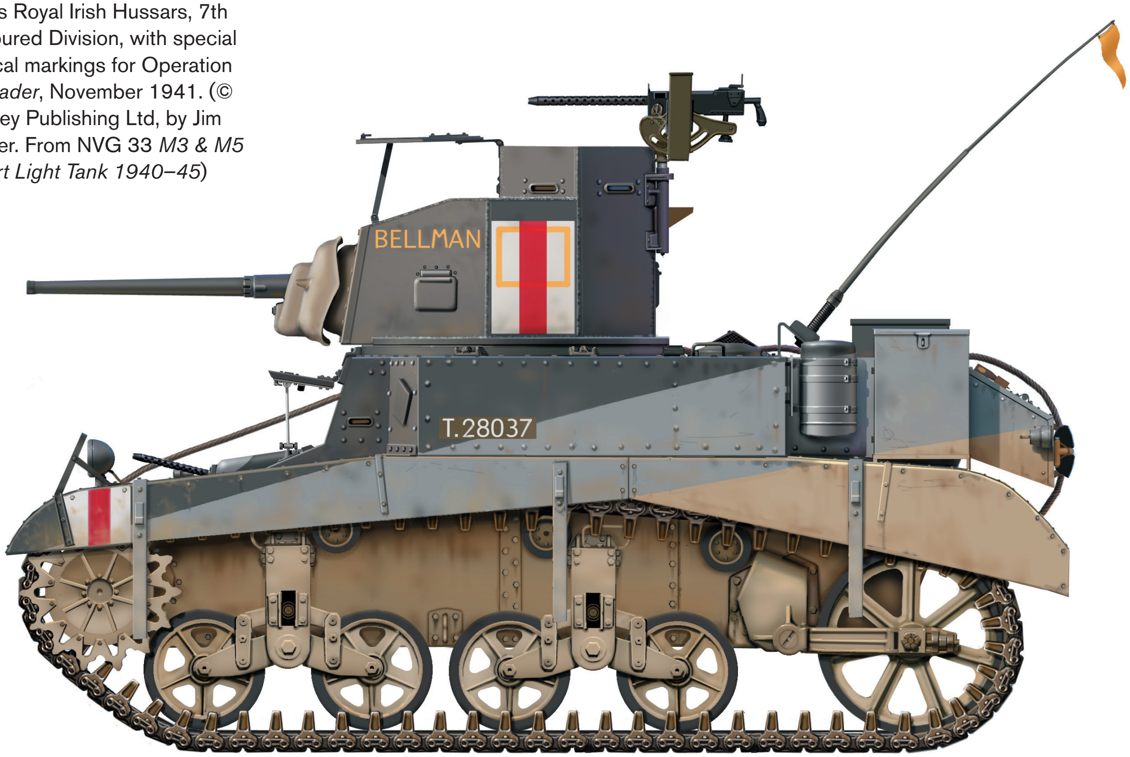
fact that it was 20 per cent cheaper than the Matilda and required 30 per cent fewer man-hours to manufacture, which made it far better suited for mass production. In the field, the Valentine also proved more reliable than the mechanically fragile Matilda (which was more resistant to shell-fire than sand).

On 19 July, a major development occurred when the first American-built tanks arrived in North Africa; a merchant vessel delivered 36 M3 and four M2A4 light tanks to Suez. When the first M3 light tank arrived in Egypt, it was regarded as quite novel due to its rubber-clad track blocks and powerful engine. The 8th Hussars received their first M3 light tank on 1 August 1941 and field tests quickly proved that the American tank could turn quickly without throwing track (like the Mk IVA) and that its engine was more reliable than the Nuffield Liberty engines on British cruisers. Another unique aspect of the M3 was that its 37mm gun was provided with the M51 APC-T round, which had superior penetration over the British 2-pdr AP rounds; indeed, Britain would not field amour-piercing rounds with ballistic caps for another year. The M3 light tank also had somewhat better armoured protection than the thin-skinned British cruiser tanks, although still less than what was desired on the battlefield of 1941. As the M3 had just entered production, the British Army received several different versions; a small number arrived in Egypt with riveted turrets and 25mm thick frontal armour but most came with the newly introduced welded turret and 38mm thick frontal armour. The main problem with the M3 light tank was that it carried only one-third as much fuel as a British cruiser tank and had a very limited operational range. In practical terms, units equipped with the M3 light tank would need to refuel every 90 kilometres in the desert. Nevertheless, British crews quickly adapted to the M3 light tank, which was dubbed the ‘Stuart’ or ‘Honey’ in British service.

A four-man US Army team, led by Major Joseph M. Colby, the designer of the M3 medium tank, also arrived to train British crews on the Stuart; thus, the first American soldiers were deployed in theatre while the United States was still nominally a neutral.[12] Additional American tehnical personnel arrived prior to the beginning of the British offensive and were attached directly to the 4th Armoured Brigade. One member of this technical support group, Sergeant Delmer E. Park, would be killed in action during Operation *Crusader* on 25 November.[13]

By the end of August 1941, the 8th Hussars had 36 Stuart tanks and had completed its initial conversion training. In September, the other two tank regiments in the 4th Armoured Brigade began converting to the Stuart as well. However, the Americans only provided about 43,000 rounds of 37mm ammunition (equivalent to three basic loads) with the Stuart tanks, which would not prove adequate for a protracted operation. In addition to the Stuart tanks, large numbers of Chevrolet trucks also began to arrive in Egypt, greatly improving British transport capabilities. Another welcome addition was the arrival of over 100 Humber armoured cars and Dingo scout cars, which were a vast improvement over the obsolete and jury-rigged collection of vehicles equipping the reconnaissance units. The early versions of the Humber were equipped with a 15mm Besa heavy machine-gun, which fired both AP and AP-T (Armour-Piercing Tracer) ammunition. In terms of mobility and armoured protection, the Humber was roughly equivalent to the German Sd.Kfz. 222 and Sd.Kfz. 232 armoured cars. By late summer, the 11th Hussars were re-equipped with the new vehicles. Another welcome addition was a company of RASC tank transporters, which helped with battlefield recovery.

British Stuart light tank, 8th King's Royal Irish Hussars, 7th Armoured Division, with special tactical markings for Operation *Crusader*, November 1941. (© Osprey Publishing Ltd, by Jim Laurier. From NVG 33 *M3 & M5 Stuart Light Tank 1940–45*)



The 8th Hussars training with their new M3 light tanks, 28 August 1941. The lead troop is advancing on line, with a second troop following close behind. This photo gives a good impression of a squadron commander's limit of visibility in desert armoured operations. (IWM, E 3467E)

As more tanks and trucks arrived in Suez, the 7th Armoured Division continued to expand and Auchinleck decided upon a change of leadership in this key formation. Although Creagh was a veteran desert commander and had made no serious mistakes, the decision was made to send him back to England so that 'Strafer' Gott could move up and take command of the 7th Armoured Division in September. While Gott was an experienced desert hand as well, he was not an RAC officer and his experience with tanks was more vicarious than first-hand. As commander of the 7th Support Group, his performance had been admirable against the Italians in 1940, but rather less so against the Germans in 1941. Gott also bears considerable responsibility for the failure of *Brevity* in May and the lacklustre performance of his support group in *Battleaxe*. He would have been an excellent choice to command a motorized infantry brigade, but Auchinleck's decision to give him 7th Armoured Division was a serious mistake.

While Auchinleck was in the midst of re-forming his forces, Rommel decided to mount an armoured reconnaissance in force into Egypt, designated *Unternehmen Sommernachtstraum* (Operation *Midsummer Night's Dream*). Von Ravenstein's 21. Panzer-Division crossed the frontier at dawn on 14 September, heading toward Bir Khirreiget, 30 kilometres south of Sollum, where German intelligence thought that the British might have established supply dumps for another offensive. Rommel accompanied the expedition. Auchinleck had pulled British armour back from the border region, leaving Lieutenant Colonel Dennis S. Newton-King's 4th South African Armoured Car Regiment (SAACR) to serve as a covering force. Two South African armoured car regiments (4 and 6) had arrived in Egypt in June, each equipped with about 54 Marmon-Herrington armoured cars – which were no match for the larger, better-armed German armoured cars. Despite finding no evidence of British supply dumps near Bir Khirreiget, von Ravenstein decided to push an armoured *Kampfgruppe* another 50 kilometres further east toward Rabia. Newton-King's armoured cars simply fell back, while keeping the Germans under observation. The 4 SAACR lost only a single armoured car and a handful of casualties.[14] When Kampfgruppe Stephan finally decided that it had enough flailing around in the desert, the South Africans called in an airstrike by two South African squadrons of Martin Maryland light bombers that caught one German column in the midst of refuelling; a number of tanks were damaged and 12 other vehicles destroyed.[15] Afterwards, Pz.Regt. 5 quickly retreated across the border, leaving two Pz III tanks as *Totalausfälle*. Considerable fuel (at least 2 V.S.) was expended for no gain and the tanks of Pz.Regt. 5 suffered considerable wear and tear during this brief operation.[16] Rommel had made the mistake of sending too large a force to conduct a reconnaissance, which did not gather information commensurate with the resources expended.

Unternehmen Sommernachtstraum also exposed the mechanical fragility of many of Rommel's tanks, particularly the 21. Panzer-Division. Pz.Regt. 5's tanks had seen much hard use in the previous six months, but had received relatively little down time to effect repairs. Under desert field conditions, it proved extremely difficult to clean sand out of engines and transmissions, and most repairs were of an expedient nature. While many narratives acknowledge the impact of fuel shortages upon DAK mobile operations, they fail to recognize the equally pernicious affects caused by limited access to POL (petroleum, oil and lubricants) and spare parts. For example, in a hot desert environment, rubber seals and gaskets tend to degrade over time and then oil and fluid leaks become common. The more tanks move in a hot environment, the more likely that friction will cause roadwheel arm hubs to begin leaking grease, and once most of the grease is gone, the roadwheel will seize up. Without adequate supplies of axle grease, tank mobility is reduced even if they have fuel. As a result of the brief foray of *Unternehmen Sommernachtstraum,* one-third of Pz.Regt. 5's tanks fell out with various mechanical defects. Although Pz.Regt. 5 quickly brought these vehicles back into service, it appears that many were probably operating in 'degraded mode', with lingering technical defects. Commanders kept these tanks in the line because they knew that there was no chance to send them back to Europe for depot-level maintenance and that it was better to have a degraded tank than no tank at all.

By mid-September, Auchinleck was ready to begin making serious organizational changes. Several new Commonwealth formations had arrived in theatre, including the 1st South African Division, the 2nd New Zealand Division and more units from the India Army. On 18 September, the WDF was re-designated as the XIII Corps, but Beresford-Peirse remained in command. The XIII Corps was intended to be an infantry-heavy corps, incorporating the new Commonwealth units, but with a significant force of infantry tanks attached. A new corps, XXX Corps, was established to control most of the mobile forces, including the 7th Armoured Division. Lieutenant General Vyvyan Pope, one of the most senior British armour officers, was flown from England to take command of XXX Corps. For the first time, the Commonwealth would have two corps-size formations operating together in North Africa, which necessitated an army-level headquarters to control them. On 26 September, the 8th Army was formed in Egypt, under the command of Lieutenant General Sir Alan Cunningham. Cunningham was an artilleryman with no real experience with mechanized operations (or even modern radios).[17] However, Auchinleck selected him to command 8th Army because of the swift and successful campaign he conducted against the Italians (leading a command that comprised four Indian infantry brigades) in East Africa between February and April 1941. Nor did Cunningham have any prior experience in the North African desert. Indeed, Cunningham was rather a dull blade, acceptable in colonial warfare, but ill-suited to fighting a peer opponent.

Soon after Cunningham took over, Pope and Brigadier Hugh Russell, commander of the 7th Armoured Brigade, died in an air crash on 5 October. Auchinleck, who was under heavy pressure from Churchill to mount another offensive as soon as possible, was forced to quickly find a new commander for XXX Corps, which was intended to spearhead the next operation. With Pope gone, there were few senior armour officers left and Auchinleck decided to look for a cavalryman. Lieutenant General Charles W. Norrie, a traditional cavalry officer with only limited experience with tanks, was picked to head XXX Corps. Norrie had been in charge of the 1st Armoured Division in England, which was beginning to arrive in Egypt. While Norrie did possess some prior desert experience and a good mix of staff and command assignments during the inter-war period, it was soon evident that he was one of those officers who had been promoted well above his level of competence.

While forming the 8th Army, Auchinleck also made it a priority to reinforce the Tobruk garrison. The Royal Navy had already brought the Polish Carpathian Brigade into Tobruk in August, and in late September the Australian 9th Division began leaving in a series of fast convoys. In their place, the British 70th Division (formerly the 6th Division) was sent into Tobruk, along with new equipment to replace losses. The tank force inside Tobruk, the

A squadron of British Matilda tanks advances in column, 1941. The WDF leadership regarded the Matilda as 'the queen of the battlefield' and expected it to be well-nigh unstoppable in a set-piece attack. (Author's Collection)

32nd Army Tank Brigade, was partly rebuilt and brought up to a strength of over 100 tanks, including 68 Matilda IIs. As a result, the Tobruk garrison gained the ability to mount powerful local counter-attacks or a link-up effort with an approaching relief force. British planning now focused on 8th Army mounting a strong relief effort, spearheaded by armour, to link up with the Tobruk garrison. Ideally, Rommel's Panzer forces would be crushed between the British hammer and anvil.

With the arrival of the 22nd Armoured Brigade and the remaining elements of the 1st Armoured Division in October, Auchinleck achieved a clear numerical superiority in tanks over Panzergruppe Afrika. If the armour in Tobruk is included, Auchinleck had over 750 tanks available (in 17 battalion-size units) against only 425 Axis tanks (in seven battalion-size units). Rather than fielding the 1st Armoured Division as a separate formation, most of its sub-units were used to reinforce Gott's 7th Armoured Division, which now possessed nine armoured battalions with a total of 481 tanks – the largest armoured formation yet commanded by a British officer. Although Auchinleck did not understand tanks, he did recognize that the British failure to incorporate infantry and artillery into their armoured operations had been part of the reason for poor performance in *Brevity* and *Battleaxe*. Instead of keeping most of the infantry and artillery assets concentrated in the divisional Support Group, they were now task-organized to the three armour brigades. Gatehouse made the most of this approach in his 4th Armoured Brigade, attaching one infantry company and one artillery battery to each of his three tank battalions. The other two armour brigades were given fewer support assets, but enough to at least reinforce their main efforts. However, much of these changes occurred in October or early November, which precluded much training in the new tactics. The Territorial Army (TA) troops in the 22nd Armoured Brigade were given the least time to train in the desert and learn new tactics before the offensive, which seriously undermined their combat effectiveness.

Gott's 7th Armoured Division spent much of October training in the desert in the region near Mersah Matruh. On 12 October, the 4th Armoured Brigade conducted a 120km road march across rocky terrain that severely damaged the rubber portion of the track blocks on many of the Stuart tanks. As a result, there was a frantic request for new track to be brought from Cairo and it was not until 29 October that all the damaged track had been replaced (in fact, the amount of damage was over-stated).[18] Many of the veteran units in 7th Armoured Brigade devoted their time to improving tank gunnery skills. Field tests by the 7th Hussars noted that the 2-pdr tended to strike well short of targets at ranges of 1,000 metres, which could have been due to a variety of factors. After much practice, gunnery skills in the veteran regiments increased, but the old practice of firing on the move was now forbidden, since it was proven to be inaccurate and wasteful of ammunition.[19]

Since the beginning of the war in the desert, the RAF had provided minimal battlefield support to the army, primarily due to lack of doctrinal emphasis. Up to this point, the Desert Air Force had been focused on fighter sweeps and battlefield interdiction sorties, usually against airfields and ports. The prevailing RAF mindset regarded finding and hitting vehicles dispersed across the desert as difficult and wastefuel of resources. Even if enemy vehicles could be identified and targeted, the RAF's available 250lb General Purpose bombs were not much threat to tanks, and few fighters were yet equipped with 20mm cannon. Furthermore, British armoured units lacked the communications equipment, training and procedures to request the kind of timely closely air support that German Panzer units enjoyed. However, when Air Marshal Arthur Tedder took over the Desert Air Force in July 1941, he resolved to shift away from the near-useless army cooperation model towards something approaching a close support model. He authorized the creation of RAF Air Support Control units to receive and co-ordinate army requests for air support; one unit was established in both XIII and XXX Corps. Mobile forward support teams were also created to join division and brigade headquarters.[20] Nevertheless, tests run in September and October indicated that army units could expect a 2.5-hour delay between the request being made and aircraft actually arriving. Furthermore, only a small portion of RAF strength was assigned to the close air support role – essentially a few squadrons of Blenheim and Maryland light bombers and one squadron of Hurricane fighters (No. 80 Sqn). Tedder had begun a shift toward air-ground cooperation on the battlefield, which would gradually improve over 1942–43.

One area that the Commonwealth forces used their time wisely was in extending the rail line 130 kilometres forward from Mersah Matruh to Misheifa, 45 kilometres south of Sidi Barrani. The British also built over 250 kilometres of tactical water pipelines from Mersah Matruh and built new pumping stations and reservoirs.[21] This one-time investment significantly reduced the amount of motor transport required to move bulk ammunition, fuel and water to forward supply depots. Altogether, the British calculated that 8th Army would require 2,972 tons of supplies per day during the offensive (including 1,500 tons fuel and POL, 480 tons ammunition and 350 tons of water).[22] Although Canada did not deploy any formations to the 8th Army, the delivery of large numbers of four-wheeled drive trucks built in Canada proved crucial in the logistic buildup for Operation *Crusader*.

In contrast, the Axis forces made little effort to expand their theatre logistic capabilities in North Africa. Apparently, it never occurred to Axis quartermasters that the construction of tactical pipelines from Tripoli even to El Agheila would have significantly reduced the burden of transporting bulk fuel to the DAK at Tobruk.[23] Rommel was also loath to devote any more of his limited resources to expanding theatre logistics – he wanted combat units, not rear area logistic units building pipelines. He was shown Luftwaffe aerial photos of the new British railroad and pipelines, but he did not recognize their value.[24] Certainly the Allied and Soviet armies recognized the importance of tactical pipelines to support manoeuvre warfare (such as PLUTO, during the 1944 Normandy invasion), but Axis quartermasters were content to simply ask for more trucks and more shipping space. As stop gaps, the Luftwaffe was able to fly small amounts of fuel in from Crete and the Kriegsmarine used a handful of *Marinefährprahm* (MFP) to bring in supplies to Bardia.

Churchill pushed Auchinleck hard to attack in North Africa, which rushed the planning of Operation *Crusader*.[25] Initially, Auchinleck set out some broad strokes, but it was clear that he intended to avoid the kind of frontal assaults that characterized *Brevity* and *Battleaxe*. Once Cunningham arrived, he was given primary responsibility for planning the offensive, although his lack of experience with armour made him cautious. Brigadier Alexander Galloway, who had helped O'Connor plan Operation *Compass*, now led the planning process at 8th Army. Like most senior British staff officers of his generation, Galloway had been trained at Camberley prior to any lessons learned from the EMF or mechanized training in the 1930s. Consequently, Operation *Crusader* was essentially based on half-digested notions about manoeuvre warfare that were rather crude and amateurish. Crucial details, such as tactical communications planning – one of the essential prerequisites for manoeuvre warfare – were neglected. Cunningham's concept of how to conduct the offensive emphasized the principles of mass and manoeuvre by concentrating his best armour in Norrie's XXX Corps to smash the enemy's armour in the opening days of the offensive. The concept was crude because it was essentially a bean-counting approach to armoured warfare that focused on numbers of tanks, which would likely lead to a battle of attrition. Furthermore, the British mis-identified the Axis operational centre of gravity as the German armour, rather than theatre logistics.[26] While Rommel was still dangerous if he lost half his armour, he was much less so if he had no fuel or ammunition.

Operation *Crusader* was also based on two risky assumptions, namely that the Germans could be induced to fight at a time and place of Cunningham's choosing and that British tankers would prevail in the ensuing slugfest. Although at least one Pz III Ausf H model with improved armour had already been captured at Tobruk, this was not briefed to front-line tank crews. Indeed, the 8th Army lacked any technical intelligence capability in 1941, which prevented them from understanding the importance of the German face-hardened armour (FHA). It was not until March 1942 that British engineers began to conduct technical analysis of captured enemy tanks – a shortfall that was entirely avoidable.[27] Prior to Operation *Crusader*, intelligence officers told British tankers that the German Pz III and Italian M13/40s would 'present no difficulties' and the only enemy tank 'that might bother us' was the Pz IV, of which only 20 were thought to be in North Africa.[28] The third assumption was that the Italian forces did not pose a serious threat and 8th Army only had to be concerned with the two German Panzer divisions. Since Operation *Compass* and Beda Fomm, the British forces had adopted a contemptuous attitude toward their Italian opponents, which began to affect operational planning.[29]

Once the German armour was destroyed, Cunningham and Galloway reasoned that it would then be a straightforward matter to brush aside the Italian infantry and proceed to link up with the Tobruk garrison. The spot chosen for this decisive clash of armour was Gabr Saleh, a remote patch of open desert 85 kilometres south-east of Tobruk. Norrie and Gott, who were picked to lead the armoured phalanx, rejected the idea that Rommel would commit his armour to contest a worthless patch of sand like Gabr Saleh and suggested a more direct approach – but Cunningham brushed off their objections. He insisted that an armoured envelopment of the Axis covering forces along the Egyptian border

The Germans were waiting at Halfaya Pass with a battery of dug-in 8.8cm Flak guns, which were also protected by minefields. (SDZ, 00089212)

would force Rommel into a meeting engagement with XXX Corps. From the start, Operation *Crusader* was undermined by this kind of inflexible mindset, which refused to examine alternative actions until forced to by circumstances. Cunningham also expected the 1st South African Division, which had only recently arrived in Egypt and was not trained for mobile warfare, to serve as a motorized infantry formation.

Another odd feature of the plan was that the XIII Corps, now under Lieutenant General Alfred Godwin-Austen, had relatively little to do in the initial phase of Operation *Crusader*, even though it was provided with 140 infantry tanks (the largest force of these AFVs yet assembled). Instead, the XIII Corps was assigned only a tentative role, not fully engaging the enemy covering forces until XXX Corps had demolished the Axis armour. Clearly, the optimum approach to the situation would have been to initiate *Crusader* by XIII Corps launching a set-piece attack against the Axis covering forces, with massive air and artillery support, and have XXX Corps ready to respond to any counter-moves by the DAK. Under these circumstances, both corps in 8th Army could have worked more closely together and massed combat power against fixed enemy positions. The only tactical aspect of Operation *Crusader* that was sound was the breakout plan developed by the Tobruk garrison. Brigadier Arthur C. Willison, commander of the 32nd Army Tank Brigade, ensured that the infantry and tankers were prepared to conduct a combined arms assault against the Axis perimeter when 8th Army approached. Willison expected to advance 16 kilometres to the Duda Ridge, south-east of Tobruk.[30] British tactical doctrine on the use of infantry tanks was well suited to an attack on a fortified line.

On the Axis side, Rommel did not expect another major British offensive for a while, but just in case he greatly strengthened the covering forces deployed along the Egyptian frontier. The garrison at Halfaya Pass (Sektor Ost) was augmented and the Italian 55ª Divisione Fanteria 'Savona' (Sektor West) was deployed in a series of strongpoints along the frontier that stretched all the way to a fortified box at Sidi Omar. In order to detect any attempt to outflank his frontier defences by using the Trigh el Abd, Rommel ordered Oberstleutnant Freiherr von Wechmar to form a regimental-size *Kampfgruppe* composed of the reconnaissance battalions from both Panzer divisions, plus a detachment of 5cm Pak 38 guns; this group was deployed west of Sidi Omar. Both of Rommel's Panzer divisions were deployed east of Tobruk, with the 15. Panzer-Division west of Gambut and the 21. Panzer-Division along the Trigh Capuzzo. Although Gambara's CAM was not under Rommel's command, Generale Bastico agreed that the 'Ariete' and 'Trieste' divisions could deploy south of Tobruk to block any British attempt at a deep envelopment. Despite warnings from a number of sources, Rommel was not inclined to think that Auchinleck would attack in November, in large part because he was loath to admit that the British might regain the initiative.

While Rommel was planning a major attack against the eastern side of the Tobruk perimeter for the period 21–25 November, the dreadful state of Axis logistics at this stage rendered this a rather pointless exercise. In particular, the Royal Navy's slaughter of the 'Duisburg convoy' on the night of 8/9 November seriously interrupted the DAK's sea lines of communications. Before Operation *Crusader* even began, the 15. Panzer-Division was already partly immobilized by fuel shortages. Even when small amounts of fuel were flown in by the Luftwaffe, the DAK was living a hand-to-mouth existence with negligible fuel reserves. Simply put, Rommel's forces lacked the fuel and ammunition to both assault a fortified position and fend off an offensive by 8th Army; his choices were limited by logistic scarcity. Thus, thanks to the interdiction campaign by the Royal Navy and RAF, Cunningham was handed the operational initiative, but the question was – did he know what to do with it?

OPERATION *CRUSADER*, FIRST PHASE, 18–26 NOVEMBER 1941

'No tank commander will go far wrong if he places his gun within killing range of an enemy.'

Brigadier George M. Davy, 17 November 1941[31]

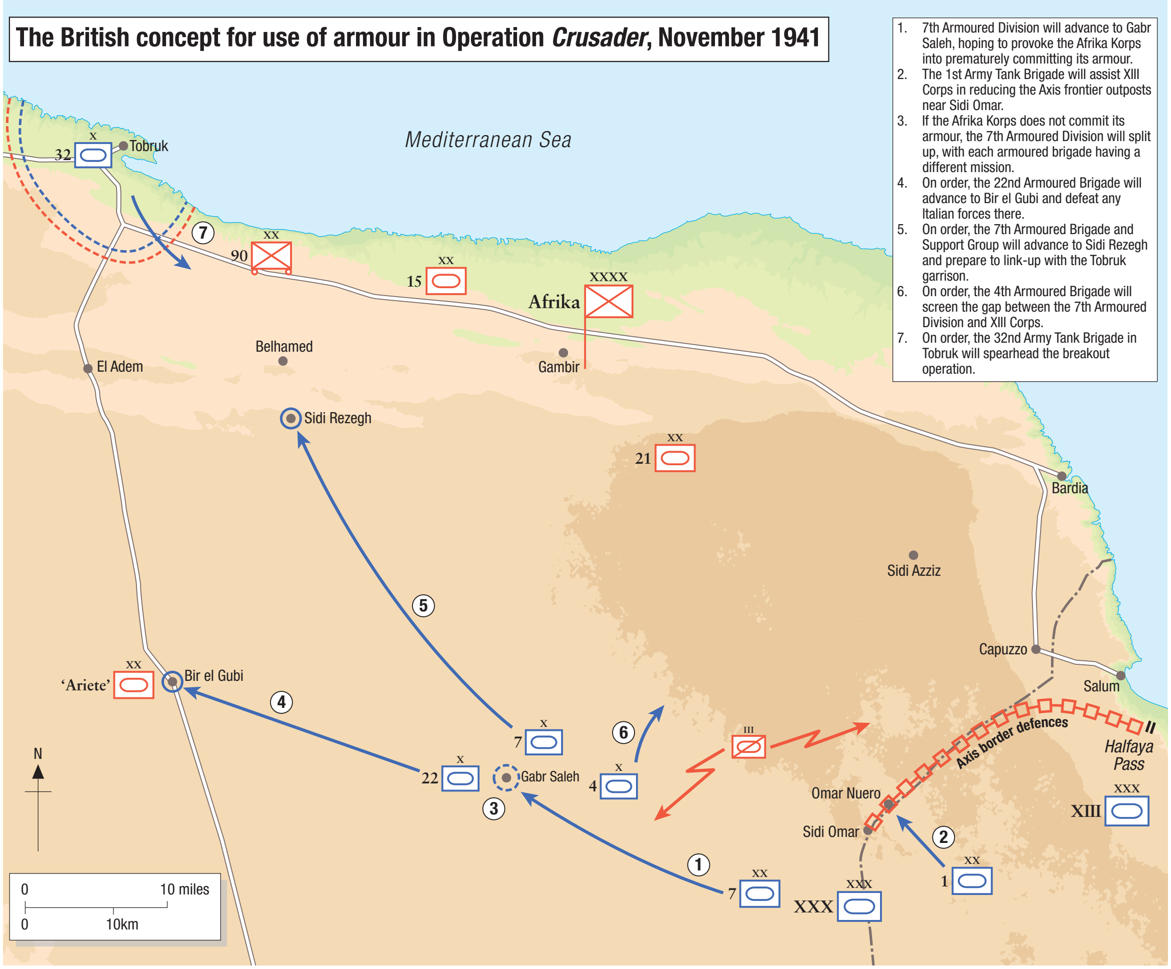
On the night before the offensive began, the 4th Armoured Brigade sent small teams across the frontier wire to drop fuel about 10 kilometres forward. Additional gaps were also made in the frontier wire. During the night, a thunderstorm with heavy rain, thunder and lightning began, which turned the desert into a muddy morass in places. No doubt it made for an uncomfortable night for tank crews expecting action in the morning.

Just before dawn, at 0540 hours on 18 November, Brigadier George M. Davy's 7th Armoured Brigade began moving out of its assembly areas and heading toward the frontier.[32] Armoured cars from the KDG and 4 SAACR moved ahead of the tanks, alert for any signs of enemy activity. Off to the right, Gatehouse's 4th Armoured Brigade also stirred into action and began its march westward. However, Brigadier John Scott-Cockburn's 22nd Armoured Brigade was the last to move westward, not leaving its assembly areas until about 0610 hours.[33] Given the lateness of the season, there were only 10 ½ hours of daylight each day (sunrise at 0555 hours, sunset at 1623 hours), which made time a precious commodity in Operation *Crusader*. Nevertheless, all three armoured brigades crossed the frontier wire between 0800 and 0810 hours, then deployed with 4th Armoured Brigade on the right flank, 7th Armoured Brigade and the Support Group in the centre and 22nd Armoured Brigade on the left. Gott's 7th Armoured Division was the most impressive mechanized formation yet fielded by Britain, and it was difficult to conceal the movement of such a large force.

Von Wechmar's reconnaissance units spotted British armoured cars and tanks soon after they crossed the frontier wire, but initial reports did not

A British Matilda tank crew just before the start of Operation *Crusader*. Surprisingly, none of the crew are making even token efforts at track maintenance, cleaning weapons or attending to any of the myriad of tasks needed to keep a tank functional in the desert. (IWM, E 6804)

suggest a large force. Furthermore, all of the British armoured brigades stopped to refuel south-west of Sidi Omar, which was confusing – was this just a reconnaissance in force? Due to a muddled tactical refuelling in the 22nd Armoured Brigade, the 7th Armoured Division did not resume its advance until 1130 hours. By noon, von Wechmar realized that he was dealing with a larger enemy force and he ordered his armoured cars to pull back. He also requested armour support from von Ravenstein's 21. Panzer-Division. However, from the British point of view, the advancing armoured units reported no enemy resistance and just a few fleeting contacts. By 1630 hours, Gott's 7th Armoured Division had reached its initial objective, with its three brigades deployed around Gabr Saleh; the 22nd to the south-west, the 7th to the north and the 4th to the east. Remarkably, the division had completed a 120km march without losing more than a handful of tanks to mechanical


Mediterranean Sea
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Capuzzo
Salum
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'Ariete'
Bir el Gubi
④
Axis border defences
Halfaya Pass
N
x
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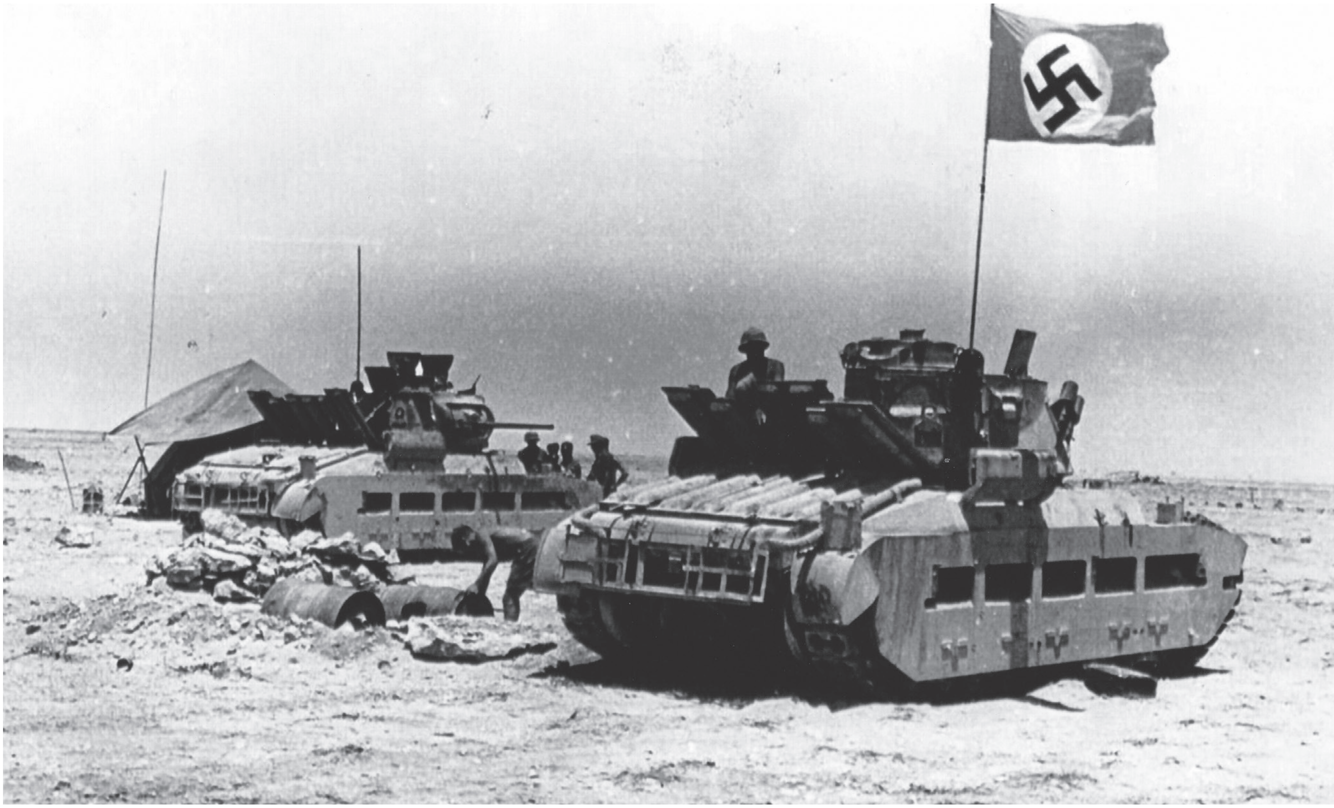
The British concept for use of armour in Operation *Crusader*, November 1941

1. 7th Armoured Division will advance to Gabr Saleh, hoping to provoke the Afrika Korps into prematurely committing its armour.
2. The 1st Army Tank Brigade will assist XIII Corps in reducing the Axis frontier outposts near Sidi Omar.
3. If the Afrika Korps does not commit its armour, the 7th Armoured Division will split up, with each armoured brigade having a different mission.
4. On order, the 22nd Armoured Brigade will advance to Bir el Gubi and defeat any Italian forces there.
5. On order, the 7th Armoured Brigade and Support Group will advance to Sidi Rezegh and prepare to link-up with the Tobruk garrison.
6. On order, the 4th Armoured Brigade will screen the gap between the 7th Armoured Division and XIII Corps.
7. On order, the 32nd Army Tank Brigade in Tobruk will spearhead the breakout operation.

problems. Just after dusk, around 1655, a detachment of A.A. 3 stumbled into 4th Armoured Brigade and reported that it was 'being attacked by 200 enemy tanks'. Von Wechmar reported this to DAK, which initially did not believe the information; this is not surprising, since up to this point in the desert war, the Germans had only seen British armour used in squadron and regimental-size groups. Crüwell wanted to move armour to support von Wechmar's screening forces, but Rommel refused to commit his Panzers until more information was available.[34] Rommel had just flown back from a meeting in Rome, via Athens, and had been out of touch with the tactical situation for several days.

Although some narratives, such as Correlli Barnett's *The Desert Generals*, claim that Cunningham was flummoxed when the Germans did not quickly appear at Gaber Saleh, the fact is that Gott issued his order for the next day less than two hours after reaching this initial objective.[35] Based upon guidance developed before crossing the frontier, the 22nd Armoured Brigade was ordered to proceed west to chase the 'Ariete' Division out of Bir el Gubi,



The Germans captured several Matildas that were abandoned on the battlefield and pressed them into service. Throughout the desert campaign, both sides made use of captured vehicles to an unusual degree. (Author's Collection)

while the 7th Armoured Brigade and the Support Group pushed forward to seize the Sidi Rezegh airfield. Gatehouse's 4th Armoured Brigade was ordered to remain in the vicinity of Gabr Saleh to protect the right flank of the XXX Corps against any move by the DAK's Panzers (and to reassure XIII Corps that British armour would protect their left flank as they moved up towards Sidi Omar). Certainly the decision to disperse the 7th Armoured Division was a violation of the principle of mass which was regarded as critical for mission success, and it invited defeat in detail – but it was not an off-the-cuff decision. Rather, it was a calculated risk, based upon assumptions that would soon prove to be false.

Although Rommel was still uncertain how large a British armoured force was south of Tobruk, Generale Gambara, commander of the CAM, was taking no chances. Armoured cars from RECAM had already encountered patrols from the 11th Hussars and the Italians were intent on not repeating previous mistakes where they had been caught by surprise.[36] Gambara alerted his command and ordered Generale Balotta's 'Ariete' division to prepare to fight a defensive action at Bir el Gubi. Balotta deployed the three battalions of the 8º Reggimento Bersaglieri in defensive positions south of Bir el Gubi, with two artillery battalions equipped with 75/27 guns in direct support. The 3rd Company of 16 M13/40 tanks (led by Tenente Pietro Pracca) from Capitano

Simone Urso's VII Battaglione Carri M. and a section of 75/27 field guns was assigned to serve as a mobile covering force in front of the infantry positions.[37] Based on the typical British preference to send in armoured cars first, this was a sound attempt at conducting a counter-reconnaissance battle. Balotta kept the bulk of his armour back, out of sight, north-west of Bir el Gubi. One MILMART battery of 102/35 truck-mounted naval guns were concealed near Bir el Gubi and the other was with the armoured reserve. Most of the Italian infantry was dug in and some mines had been laid.

At 0700 hours on 19 November, the 22nd Armoured Brigade left its assembly area and began marching the 40 kilometres to Bir el Gubi. Brigadier Scott-Cockburn deployed his brigade in two-up/one-back fashion, with Lieutenant Colonel Norman A. Birley's 2 Royal Gloucestershire Hussars (RGH) on the right flank, Lieutenant Colonel William G. Carr's County of London Yeomanry (4 CLY) on the right flank and Lieutenant Colonel Richard K. Jago's 3 CLY trailing in reserve. However the brigade was so spread out that each regiment was out of visual range of each other and radio communications were already proving problematic. The Humber armoured cars of Lieutenant Colonel William I. Leetham's 11th Hussars moved in front of the brigade, seeking out the enemy. The 22nd Armoured Brigade was certainly an impressive force, with its total of 148 Crusader tanks, but it only had one infantry company and one artillery battery in support.

Around 0930 hours, B Squadron from the 11th Hussars spotted a company-size group of Italian tanks north-west of Point 181 (17 kilometres

By the late summer of 1941, the Italians finally had a corps-size mechanized force in North Africa. Here, M13/40 tanks from the VII Btgl. carri M. in the 'Ariete' Division await an order to move. Note the white air recognition symbol on the turret. (Filippo Cappellano)

east of Bir el Gubi) and alerted Major Douglas M. Reinhold's H Squadron, which was leading 2 RGH. Reinhold's Crusaders quickly engaged Tenente Pietro Pracca's covering force. The company-on-company action lasted ten minutes. Reinhold claimed six M13/40s destroyed, but in fact three were destroyed and seven damaged by 2-pdr fire. However, the Italian tanks also hit at least three Crusaders, including Reinhold's. Pracca's tank was hit in the engine compartment, but he managed to lead the remaining Italian tanks back toward Bir el Gubi.[38]

During the action, Gott arrived at Scott-Cockburn's command post. Encouraged by the initial success of the skirmish, Gott ordered the brigade to attack the Italian 'Ariete' positions around Bir el Gubi, possibly hoping that the Italians would withdraw.[39] Around 1000 hours, Scott-Cockburn ordered his brigade to deploy on line and advance, with the 4 CLY on the left, 2 RGH in the centre and 3 CLY on the right. However, 2 RGH had already pulled ahead of the rest of the brigade and was veering across the intended path of the 3 CLY. As a result, the 22nd Armoured Brigade's advance quickly became disorganized. Balotta, observing the British armour deploying, decided to draw his infantry in tighter and ordered the two flank battalions to shift inward, with the V Battaglione Bersaglieri forming the main point of resistance.

At about 1030 hours, Reinhold's H Squadron and Major William A. B. Trevor's G Squadron approached the eastern outskirts of Bir el Gubi and came under artillery fire. The British tankers buttoned up and continued to advance with G Squadron in the lead, but soon realized they were moving into an area with trenches and fighting positions. The two lead squadrons had unwittingly moved into the midst of the defensive positions of the 8º Reggimento Bersaglieri's support weapons battalion (III Battaglione armi d'accompagnamento). Second Lieutenant John N. Harper decided to unbutton to get his bearings, but was immediately shot through the head and killed.[40] Italian tracer fire rained on the British tanks, forcing them to stay buttoned up.

Despite the limited visibility (the commander had a single vision periscope, which could rotate), Major Trevor's G Squadron continued to advance and soon encountered a small group of trucks. Some troops from the support weapons battalion were belatedly moving their heavy weapons to comply with Balotta's order to regroup and were caught with their 47mm anti-tank guns still mounted in the back of trucks. The British tankers used their Besa coaxial machine-guns to shoot up several trucks, which prompted some of the *bersaglieri* gunners to attempt to surrender. However, Major Trevor ignored them and continued to press on – leaving most of the enemy weapons intact. Major Reinhold's tanks also continued to advance, but several were hit by other Italian guns that had been emplaced; one Crusader was penetrated four times, but remained operational. At least two British tanks were immobilized and surrounded by Italian infantry, who succeeded in capturing one crew. Now disorganized and with many tanks having their radio antennas shot off, the two squadrons paused and tried to re-form. Nearby, Sottotenente Attilio

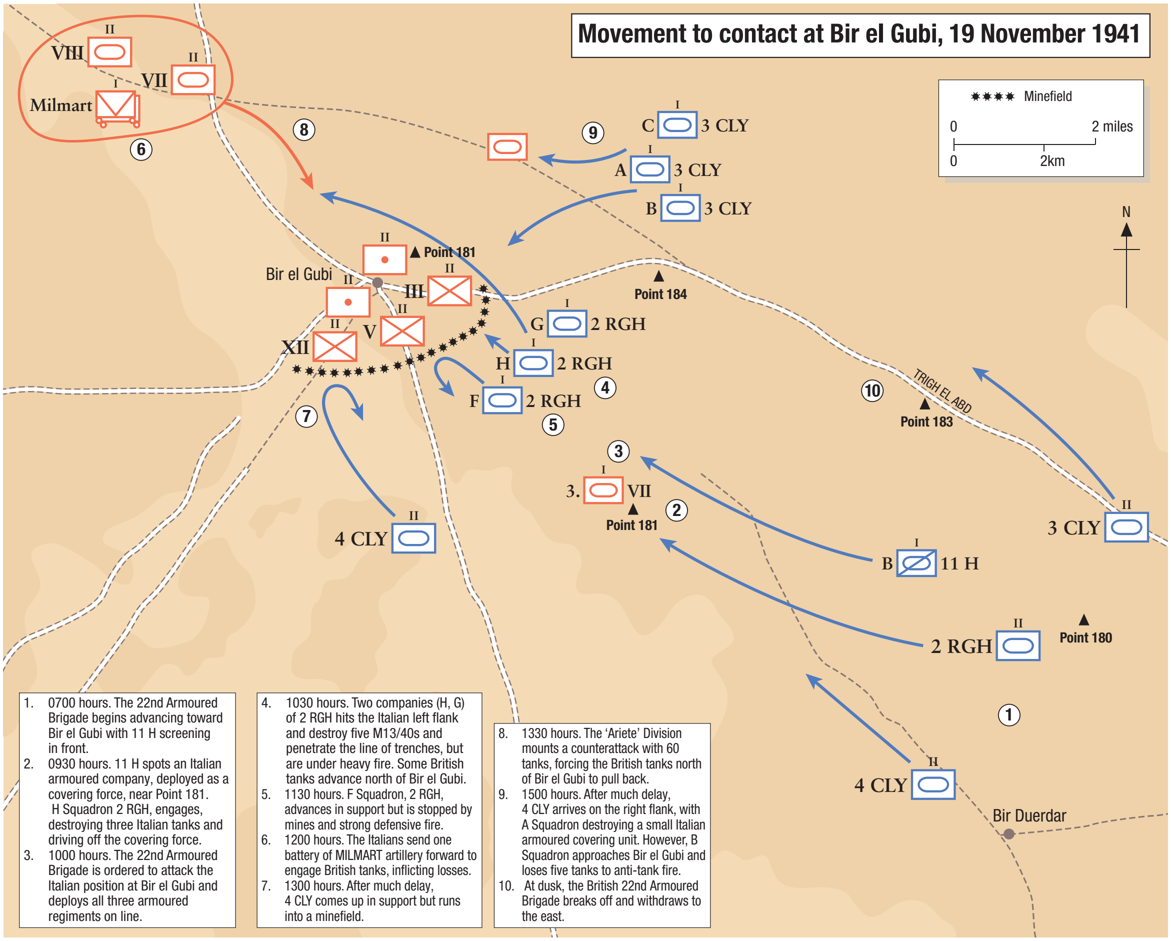
Colli, a platoon leader in the IX Battaglione carri M., spotted the British tanks amid the *bersaglieri* positions and decided to mount an impromptu counter-attack. Despite the bravery of the effort, Colli's five M13/40s were quickly destroyed by G and H squadrons. Although the 2 RGH had partly breached the left flank of the Italian infantry positions, the British attack was faltering due to poor situational awareness and lack of support.

Lieutenant Colonel Birley ordered Major J. W. Saleby's F Squadron to advance and support the two lead squadrons, but Saleby unexpectedly bumped into the fortified positions of the V Battaglione Bersaglieri and was stopped cold by heavy defensive fire and anti-tank mines. Around noon, the Italians brought up their 'secret weapon' – the MILMART battery of 102/35 guns – which began to engage Major Saleby's stalled F Squadron. The Italians claimed that the MILMART guns destroyed 15 British tanks, and the large shells certainly could have wreaked havoc on the thin-skinned Crusaders. At least one Crusader had its turret blown off by a direct hit and others were immobilized by damage to running gear. Based on the 2 RGH War Diary, it is clear that Major Saleby's tank was knocked out and he was captured.

Although some accounts suggest that the British 22nd Armoured Brigade erred in making a Balaklava-style cavalry charge at Bir el Gubi, this is incorrect.[41] Yet it is clear that Scott-Cockburn committed his three tank regiments to the morning action in piecemeal fashion, without any meaningful support from the rest of the brigade. Jago's 3 CLY was supposed to be right on Birley's flank but instead drifted away from the battle area, and only a single squadron joined the action around 1500 hours.[42] British command and control at this point was simply awful, with radio communications spotty, and it is difficult to see how the brigade was oblivious to the fact that Birley's 2 RGH had stirred up a hornet's nest. The brigade did not get any artillery (the eight 25-pdrs of C Battery, 4 RHA) into the fight until around noon and Carr's 4 CLY was not ordered to support 2 RGH until 1300 hours. The 4 CLY tried to get around the Italian right flank but ran into mines and was stymied. Rather than a massed cavalry charge, the 22nd Armoured Brigade was fighting a piecemeal action in slow motion.

From the Italian perspective, it is not clear how much control Balotta had over the action either. Italian artillery and anti-tank guns were firing like mad at Birley's tanks, knocking out some, but it was not until 1330 hours that the defenders became more aggressive. The Bersaglieri appeared hard-pressed by the British tanks and Tenente Colonnello Enrico Maretti, commander of the 132° Reggimento Carri, decided it was time to commit the mass of Italian tanks to a counter-attack, in accordance with Italian tactical doctrine. He ordered about 60 tanks from the VII and VIII Btgl. Carri M. (Maretti decided to keep the IX Btgl. Carri M. in reserve) to advance south against the British tanks. The second MILMART battery was also committed to the counter-attack.

By this point, the 2 RGH had perhaps 30 tanks still in action, but only F and G Squadrons were facing the Italian armour; as a result, the



Movement to contact at Bir el Gubi, 19 November 1941

1. 0700 hours. The 22nd Armoured Brigade begins advancing toward Bir el Gubi with 11 H screening in front.
2. 0930 hours. 11 H spots an Italian armoured company, deployed as a covering force, near Point 181. H Squadron 2 RGH, engages, destroying three Italian tanks and driving off the covering force.
3. 1000 hours. The 22nd Armoured Brigade is ordered to attack the Italian position at Bir el Gubi and deploys all three armoured regiments on line.
4. 1030 hours. Two companies (H, G) of 2 RGH hits the Italian left flank and destroy five M13/40s and penetrate the line of trenches, but are under heavy fire. Some British tanks advance north of Bir el Gubi.
5. 1130 hours. F Squadron, 2 RGH, advances in support but is stopped by mines and strong defensive fire.
6. 1200 hours. The Italians send one battery of MILMART artillery forward to engage British tanks, inflicting losses.
7. 1300 hours. After much delay, 4 CLY comes up in support but runs into a minefield.
8. 1330 hours. The 'Ariete' Division mounts a counterattack with 60 tanks, forcing the British tanks north of Bir el Gubi to pull back.
9. 1500 hours. After much delay, 4 CLY arrives on the right flank, with A Squadron destroying a small Italian armoured covering unit. However, B Squadron approaches Bir el Gubi and loses five tanks to anti-tank fire.
10. At dusk, the British 22nd Armoured Brigade breaks off and withdraws to the east.

Italians enjoyed a rare 2-1 numerical advantage. Maretti halted his tank regiment about 3 kilometres from the British tanks and called in an artillery barrage. Then the Italian tanks began to advance. Second Lieutenant Geoffrey Gordon-Creed in H Squadron later wrote that 'shells were bursting around the place and bits of metal clonked against the tank. Then we saw them in front of us. No possible mistake. No chance of counting them, too much dust.[43]

Unlike standard British tactical doctrine, the inexperienced 2 RGH did not seek to engage from hull-down positions but instead deployed more or less on line and began to fire at the approaching Italian tanks. Not only did the Italian tanks have an edge in numbers, but they also had supporting fire from their own artillery (including at least one MILMART gun) and anti-tank weapons. Furthermore, more Italian tanks had radios now, unlike Beda Fomm. The Italian tanks started firing at over 1,000 metres but gradually closed to less than 800 metres.[44] Although stationary, the 2 RGH's gunnery was not particularly accurate and losses were about even on both sides. Birley's regimental command tank was one of those knocked out and he was wounded. However, two Italian tank company commanders were killed in the action and an M13/40 command tank was destroyed, along with its valuable radios.

Second Lieutenant Gordon-Creed was in the thick of the fight. He wrote, 'the din was terrific, and the dust. It cleared for a second and there was an M13, 400 yards off. McRae [his gunner] fired twice and the M13 was alight… then something hit us'. Gordon-Creed's track was knocked off by a hit on the running gear, but he remained in action. 'I kept swinging the periscope. Suddenly a patch cleared and there was an M13 about forty yards off. My fire command went to hell in a scream, "gunner, traverse right, tank fifty yards!"'[45] Gordon-Creed recollected that 'scarcely had I spoken when a 50mm shell pierced the turret with a hell of a bang. It smashed through my gunner's shoulder, ricocheted off the firing mechanism of our 2-pdr gun and ripped up the back of my loader, who was twisting around reaching for another shell. A three-inch steel splinter went deep into my thigh, although I was unaware until hours later. Instant and total chaos – and no intercom working inside the tank.'[46] Although wounded and disabled near Italian positions, Gordon-Creed succeeded in escaping and was awarded the DSO (Distinguished Service Order).

The tank action dragged on for three hours, until darkness began to fall. One squadron from 3 CLY got involved late in the engagement, claiming five Italian tanks but losing several of its own. British radio communications completely broke down during the extended tank battle, handicapping their ability to fight as a team. Eventually, someone ordered a withdrawal and tanks began disengaging. As British tanks returned through the *bersaglieri* positions they had overrun earlier, they were fired upon by gunners who had emplaced their weapons. The battered 22nd Armoured Brigade withdrew under fire, having failed to accomplish its mission. While there is no doubt that the action at Bir el Gubi was an Italian tactical victory (they held their positions and repulsed a large-scale British armoured attack), the results were more ambiguous than simple loss statistics suggest. Available data claims that the 22nd Armoured Brigade lost a total of 42 Crusader tanks, although some were later recovered. Birley's 2 RGH suffered the heaviest losses, with 30 of 46 tanks out of action and 50 crew casualties (including 25 captured). A number of disabled tanks 'self-recovered' during the night, after fixing broken tracks. The other two British tank regiments, though lightly engaged, still lost a total of 12 tanks and 32 casualties. The poor British performance in the action was attributable to inadequate training and lack of combat experience, with a dash of incompetence added at brigade level.

On the Italian side, at least 29 M13/40s were knocked out and 15 damaged, but since they held the battlefield, some of them were probably repairable. The 132° Reggimento Carri had a total of 132 casualties (including 16 killed), which suggests heavy casualties among medium tanks that were hit. Italian accounts mention that some of their tanks were hit 2–3 times by 2-pdr fire, killing or wounding the entire crew. The *bersaglieri* lost all eight of their 47mm anti-tank guns, which is rather surprising. There is no doubt that both sides fought bravely at Bir el Gubi, although not necessarily with much skill. The Italians enjoyed combined arms by default but did not take full advantage of it – they had the means at their disposal to utterly demolish the isolated 2 RGH but allowed it to slip away. While the 'Ariete' held its ground in its first major division-size action and fought in accordance with the principles of existing Italian armoured doctrine, the doctrine was unable to achieve more than a limited success. Gott paid relatively little attention to the 22nd Armoured Brigade's failure at Bir el Gubi and apparently believed that 'Ariete' had been defeated (British accounts repeatedly claim that German tanks and 8.8cm guns were at Bir el Gubi).[47]

While the 22nd Armoured Brigade was engaged at Bir el Gubi, Brigadier George M. Davy's 7th Armoured Brigade remained in the vicinity of Gaber Saleh on the morning of 19 November and did not begin advancing toward Sidi Rezegh until 1415 hours. Davy was an artillery officer who had seen limited service with cavalry in India, but was primarily a staff officer – a bit of an odd choice to lead an armoured brigade in combat. Although Davy's later DSO citation mentions his 'rapid advance' to Sidi Rezegh, most of the day was wasted in local patrolling and the advance did not commence until there were only three hours of daylight left.

No resistance was encountered in the advance to Sidi Rezegh and the Italian Regia Aeronautica at the airfield was not warned of the approach of British armour – a clear failure by von Wechmar's Aufklärungs Gruppe. With the help of fast Stuarts of 3 RTR from the 4th Armoured Brigade, the KDG managed to chase off most of von Wechmar's armoured cars. Indeed, the Stuarts proved well-suited to the counter-reconnaissance role. One of the golden rules of covering force duty is to gain and maintain contact with the enemy and report on their movements, which did not happen here. The German reconnaissance failure is particularly odd in that the Luftwaffe had already spotted the 7th Armoured Brigade earlier in the morning and the British made a simple straight-line advance to Sidi Rezegh. In any case, around 1600 hours the 7th Armoured Brigade reached the escarpment overlooking the Sidi Rezegh airfield and the 6 RTR moved forward and overran the position. Nineteen Italian aircraft (17 fighters and two transports) were captured on the airfield, along with 60 personnel.[48] Amazingly, there was virtually no immediate Axis reaction. Rather than exploit this success and seize the dominant escarpment north of the airfield, the 7th Armoured Brigade instead went into laager, refuelled and waited for reinforcements.

Rommel spent the morning of 19 November denying Crüwell permission to commit any of his Panzers until further information arrived to clarify the situation.[49] The Luftwaffe confirmed the presence of British armour and motor transport around Gabr Saleh, but von Wechmar's spotty reporting was not helpful. Finally, at 1210 hours, Rommel authorized von Ravenstein's 21. Panzer-Division to send Kampfgruppe Stephan to deal with the reported British armour.[50] Oberstleutnant Friedrich Stephan would have no infantry

The Afrika Korps had a small number of tank transporters, which could be used to move damaged or non-operational vehicles. Occasionally, transporters were used to bring new tanks forward from Benghazi or Tripoli. (Author's Collection)

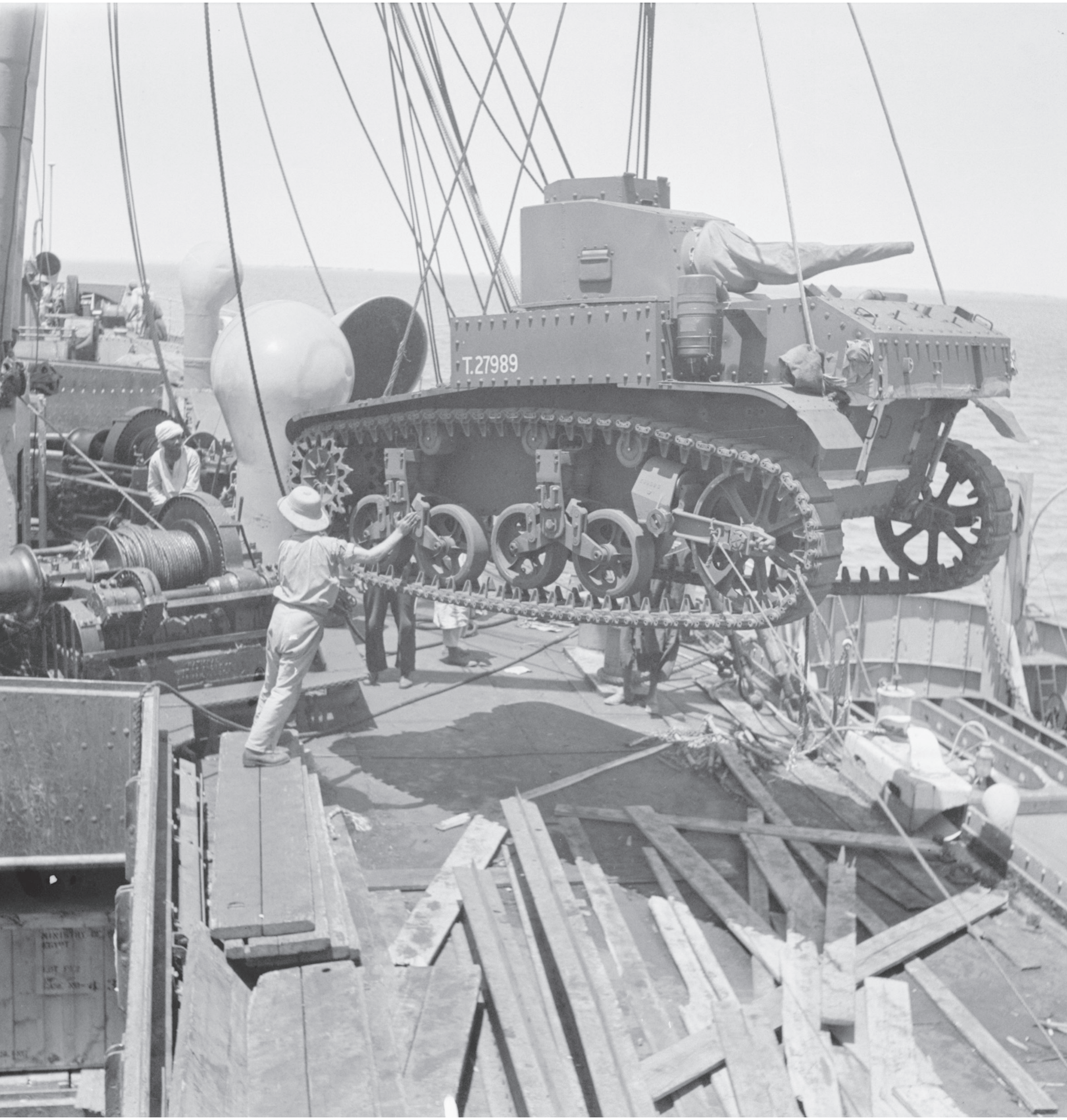
support, since the 21. Panzer-Division only had limited fuel reserves. It took two hours for Kampfgruppe Stephan to assemble south of the Trigh Capuzzo and it did not actually begin moving until 1420 hours. Stephan was ordered to seek out and engage the British armour; his regiment marched with II./Pz.Regt. 5 in the lead, followed by I./Pz.Regt. 5. Meanwhile Gatehouse's 4th Armoured Brigade had become dispersed, with most of the 3 RTR being committed to support the KDG against von Wechmar's Aufklärungs Gruppe. The 5 RTR had also drifted off to the east, leaving only Lieutenant Colonel Dick S. Cripps' 8th Hussars to hold position near Taieb el Essem. At about 1530 hours, Kampfgruppe Stephan was spotted moving south and Cripps began moving northward to meet them. Just before the meeting engagement began, the Luftwaffe appeared and strafed Cripps' regimental command post, causing some confusion.

Just after 1600 hours, Kampfgruppe Stephan spotted the British tanks and deployed. Rather oddly, the Germans opened the engagement at the extreme range of 1,500 metres. Slowly, the range closed to about 700 metres, but apparently no closer. The Germans had a small numerical superiority, with 85 gun-armed medium tanks engaging 52 Stuarts. Although many details of this action are sketchy, essentially both sides were content to forego manoeuvre and engage in a protracted gunnery duel that went on for three hours. The Germans managed to get their 8.8cm Flak battery into action, but they destroyed only two Stuarts. Brigadier Gatehouse had difficulty pulling his brigade together and only one squadron from the 5 RTR joined the battle near the end (losing five Stuarts).[51] At that point, with darkness falling and more British tanks arriving, Stephan elected to break off the action and withdraw to the north-west. The 8th Hussars had done fairly well, holding off a superior force at the cost of 20 of its 52 Stuarts. Personnel casualties were significant, including one squadron commander (Major J. C. Vernon-Miller) being captured. Another outcome of the action was that the 4th Armoured Brigade had consumed a great deal of 37mm ammunition (some tanks had fired up to 250 rounds) and had to make an urgent request back to the supply warehouses in Cairo to send all the remaining American-made rounds forward. On the other side, the Germans admitted the loss of one Pz II and seven Pz III tanks, although more were damaged. Some recent analysis has seized upon the 21. Panzer-Division's daily tank status reports – which indicate that 37 tanks were not operational the next day – to suggest heavier losses. However, as noted earlier, many of Pz.Regt. 5's tanks were already in poor mechanical condition due to logistic starvation and easily side-lined.[52] Interestingly, Pz.Regt. 5's maintenance officer was Major Archibald MacLean, originally born in Scotland. MacLean worked tirelessly to keep Kampfgruppe Stephan's tanks running, but very few repair parts were available.[53]

In any case, Cunningham had sought to fight a major tank action near Gabr Saleh and when it came near the end of the second day of Operation *Crusader*, Gott's 7th Armoured Division was only able to commit two of its nine armoured regiments against two Panzer battalions. Although the result of the tank battle near Gabr Saleh was tactically inconclusive, it did finally convince Rommel that he was dealing with a major British armoured offensive. Yet in his command post near Gambut (only 40 kilometres from Sidi Rezegh), Rommel was still strangely oblivious to the enemy situation, which his intelligence officer von Mellenthin was telling him was 'obscure'.[54] He decided to release the 15. Panzer-Division to Crüwell, but provided only the vaguest command guidance: Crüwell was to lead both Panzer divisions the next day to defeat the British spearhead, although he left the direction of attack up to his subordinate. In essence, Rommel was instructing Crüwell to 'do something', without defining what the 'something' should look like; this was not *Auftragstaktik*, just sloppy generalship. Rommel also ordered Generalmajor Max Sümmermann, commander of the Divisionskommando z.b.V. Afrika, to move a *Kampfgruppe* to Belhamed to prevent the British armour at Sidi Rezegh from breaking through to Tobruk, which was a tall order for a patchwork division with very limited anti-tank and artillery weaponry.[55]

On the British side, the situation on the night of 19/20 November was less clear. Norrie ordered Gott to send the Support Group to reinforce 7th Armoured Brigade at Sidi Rezegh, but otherwise made no major changes. The 22nd Armoured Brigade was to remain off on its own near Bir el Gubi until the 1st South African Division came up to deal with 'Ariete'. Gatehouse's 4th Armoured Brigade was ordered to concentrate, but not assigned any mission beyond covering the left flank of XIII Corps. Cunningham, back in his forward command post near Fort Maddalena on the frontier (about 180 kilometres from Sidi Rezegh), was virtually cut out of the equation by persistent radio problems.[56]

OPPOSITE The first batch of American-built M3 light tanks arriving in Egypt in July 1941. A small team of US Army ordnance personnel also arrived in Egypt to help support the M3 tanks, even though the United States was not yet a belligerent. (IWM, E 4312)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Crüwell was an able armoured tactician, but the DAK's intelligence and logistic handicaps made it difficult for him to strike a telling blow. Based on von Wechmar's reporting (which gave a false impression about 3 RTR's activity), Crüwell thought a British armoured brigade was operating near Sidi Azeiz, which made sense if it was trying to isolate the frontier garrisons. As a result, on the morning of 20 November, Crüwell decided to send Generalmajor Neumann-Silkow's 15. Panzer-Division east along the Trigh Capuzzo – which found nothing. The 15. Panzer-Division then swung south-west to continue combing the desert, but ran out of fuel 20 kilometres north-west of Sidi Omar; the division remained immobilized for the rest of the day.[57] Had 7th Armoured Division discovered the out-of-fuel German tanks, Gott might have been able to destroy half of Rommel's armour in an afternoon, but the fog of war had settled thickly over the *Crusader* battlefield. Meanwhile, Crüwell had ordered von Ravenstein's 21. Panzer-Division to link up with Kampfgruppe Stephan and then strike the British armoured brigade that it had fought the previous day. Rather than a concentrated blow, Crüwell conducted two simultaneous division-size movement-to-contact operations.

As it turned out, Kampfgruppe Stephan had laagered less than 5 kilometres from the 8th Hussars' night laager, and both sides quickly re-discovered each other on the morning of 20 November. However, Kampfgruppe Stephan had not refuelled during the night (its supply column could not find it in the dark) and did not want to resume action until it had more fuel. Second Lieutenant Robert J. Crisp, a troop leader in C Squadron, 3 RTR, later wrote that 'away in the distance, I spotted a column of vehicles replenishing with petrol, but could not be sure which side they belonged to. Neither could anybody else'.[58] This would have been an excellent time to request an RAF air strike or lay down an artillery barrage on the German refuelling column, but Brigadier Gatehouse proved strangely passive. He gathered up his brigade and requested additional support from Norrie, but otherwise seemed content to wait for the enemy to make the next move. Norrie ordered 22nd Armoured Brigade to break off from Bir el Gubi and move east to join up with 4th Armoured Brigade.

For reasons not entirely clear, von Ravenstein did not make a move until around 1600 hours; he apparently wanted to fight a set-piece action. Von Ravenstein's attack began with an artillery barrage, followed by an advance by Stephan's Panzers against Ewin's 3 RTR. B Squadron was hard-pressed and began falling back, which soon encouraged a general retreat by the rest of 3 RTR. Gatehouse ordered Drew's 5 RTR to shift to the left to support 3 RTR, but by the time that it arrived the battle had devolved into a running melee action. Drew's tanks fired a great deal of ammunition at long range, then they too fell back. British sources are noticeably silent on this action, which was essentially a rout that caused 4th Armoured Brigade to fall back about 10 kilometres. Altogether, the 3 RTR had 26 Stuarts put out of action, whereas Pz.Regt. 5 lost only four tanks.[59] Von Ravenstein appeared satisfied that he had pushed back the British brigade, although the action did not achieve much. By the time that the 22nd Armoured Brigade arrived at dusk, the action was over.

While Crüwell was trying to find and crush the mass of British armour, Sümmermann's infantry were trying to contain Davy's 7th Armoured Brigade at Sidi Rezegh. A battalion-size counter-attack to retake the airfield was easily brushed aside, but Sümmermann emplaced some of his artillery on the northern escarpment and began to annoy the 6 RTR in the valley below. He also requested Stuka strikes, which bombed Davy's brigade headquarters. The Germans brought up a battery of 8.8-cm Flak guns and some of the Panzerjäger I self-propelled tank destroyers to prevent the British tanks from moving north-west toward Tobruk. Campbell's Support Group arrived around 1200 hours, which strengthened the British hold on Sidi Rezegh. Gott also arrived and noted that enemy resistance in the area was lighter than expected. In an optimistic frame of mind, Gott recommended to Norrie that the Tobruk garrison should begin its breakout as soon as possible, in order to link up with the British forces at Sidi Rezegh.

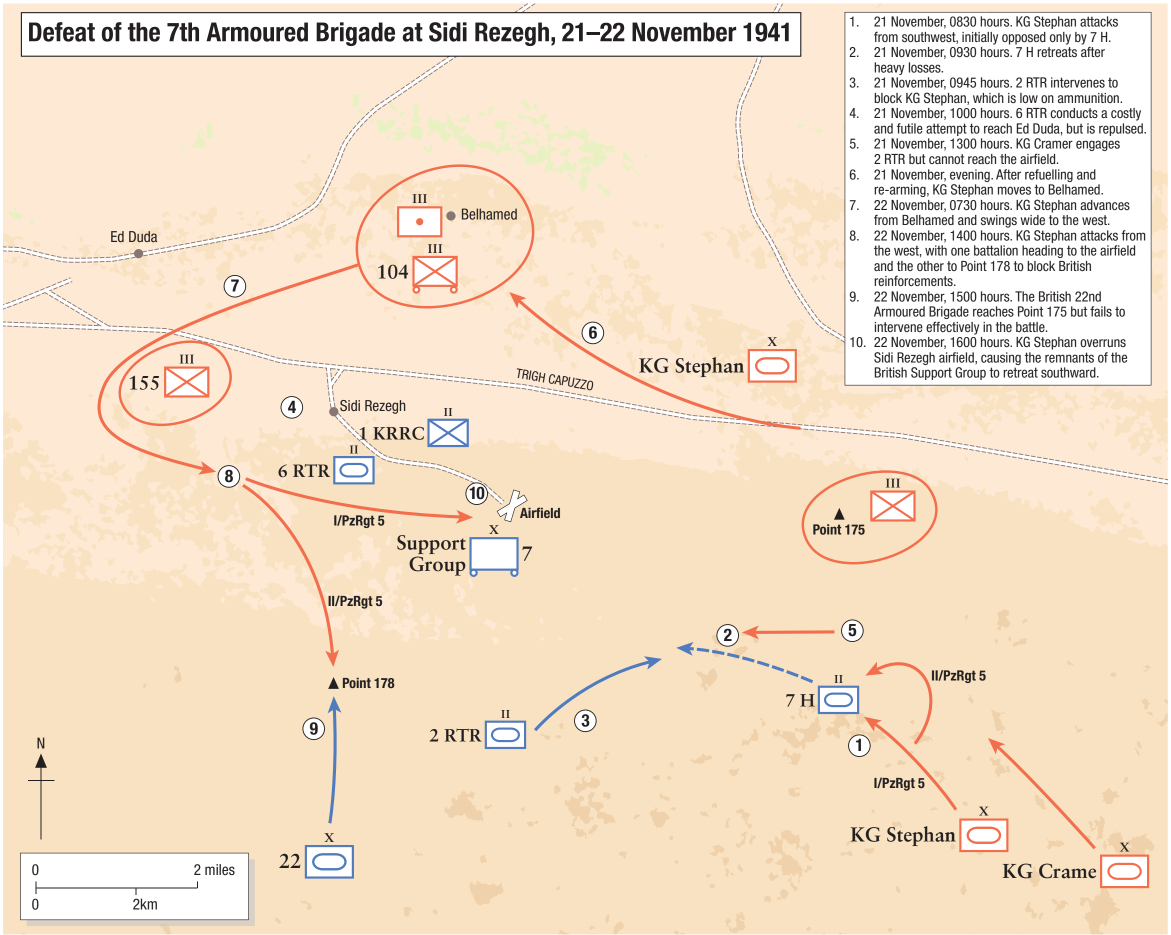
Norrie passed this recommendation along to Cunningham, who hastily decided at 1600 hours to authorize the Tobruk garrison to begin its breakout at dawn, the next day.[60] To support this effort, Norrie ordered the South African 5th Infantry Brigade to move to Sizi Rezegh. The intact 'Ariete' Division and the rest of the Italian CAM were virtually ignored, with the remainder of the 1st South African Division ordered to mask them. At one stroke, Cunningham had scuppered the main concept behind *Crusader*, which was to destroy the German armour, then link-up with Tobruk. Furthermore, Norrie's XXX Corps was now so thoroughly scattered that its ability to defeat the DAK in any stand-up action was questionable. Gott compounded this problem by issuing vague orders to his division for the next day, with the 4th and 22nd armoured brigades to seek out the enemy armour in their sector, while 7th Armoured Brigade and Support Group mounted a small attack to assist the Tobruk breakout.[61] In Gambut, Rommel finally realized that Sidi Rezegh was the decisive point on the battlefield and ordered Crüwell to converge upon that position with both Panzer divisions as soon as possible. As evening fell on 20/21 November, the German Panzer divisions refuelled and prepared to move westward at dawn.[62]

Inside Tobruk, Brigadier Arthur C. Willison's 32nd Army Tank Brigade and four infantry battalions from the 70th Infantry Division began their breakout at 0630 hours on 21 November. The sector chosen for the breakout, on the south-east corner of the perimeter, was defended by elements of the Italian 'Bologna' Division and the German Divisionskommando z.b.V. Afrika (the British were not aware this sector was defended by German troops). The operation was modelled on the similar attack at Bardia in 1940, with an artillery barrage, followed by infantry creating a breach through the enemy obstacle belt, then pushing the infantry tanks through to reach the final objective – Ed Duda. British armoured doctrine was specifically designed to conduct this kind of set-piece deliberate attack. O'Carroll's 4 RTR spearheaded the attack with 51 Matilda II tanks, while Major Harper's D Squadron 7 RTR added another 17 Matildas. However, on this battlefield, the enemy obstacle belt was much thicker and the defensive fire more intense than expected. Numerous Matildas were disabled by mines and Sümmermann committed two companies of his self-propelled guns from Pz.jg.-Abt. 605 (Sfl.) to try and stop the breakout. By 0900 hours, the British had created a significant breach, but the Italian artillery inflicted heavy losses on the assault troops. By 1015 hours, the British had achieved a deep breach in the Axis line, but tank and infantry losses sapped the remaining momentum. Brown's 1 RTR, which was intended to lead the final push to Ed Duda, attacked without infantry support and its elderly cruiser tanks suffered crippling losses. Adding to British difficulties, Rommel arrived and personally directed some of the anti-tank guns and a battery of four 8.8cm Flak guns in order to stop the British attack.[63]

By the late afternoon, the breakout attempt had carved out a wide salient, 5 kilometres deep, but it had stalled before reaching Ed Duda. All three British tank regiments were badly bloodied, with at least 43 of 68 Matildas and 20 of 28 cruisers disabled; many of these tanks would be recovered and repaired, but for the moment, Willison's brigade was reduced to just 33 operational tanks (excluding light tanks). The British infantry had also taken a pasting, with the 2nd Battalion Black Watch suffering 45 per cent losses; this had not turned out like Bardia. Axis losses were also heavy, with three battalions destroyed and over 1,000 men captured. Thirteen of the Panzerjäger I tank destroyers had been lost, as well as over 20 artillery pieces.[64] Nevertheless, the Axis forces had succeeded in stopping a very strong British armoured–infantry attack.

Gott had intended to begin his own attack to support the breakout at 0830 hours on 21 November, using Brigadier Campbell's support group and two tank regiments from Davy's 7th Armoured Brigade. However, at 0755 hours, South African armoured cars spotted a large force of German armour approaching Sidi Rezegh from the south-east. At this critical moment, Gott was not present or even in communications (he was back near Gaber Saleh and having radio problems), so Campbell and Davy were forced to make their own decisions. Campbell decided to continue with his attack to link up with the Tobruk garrison but gave 2 RTR back to Davy, who would block the approaching German armour with two tank regiments. Rather than uniting, the British armoured division was sub-dividing in the face of a major enemy armoured attack.

Brigadier Campbell launched a conventional assault on the northern escarpment overlooking the Sidi Rezegh airfield with the 1 KRRC and one infantry company from the 2 Rifle Brigade (RB), supported by over 30 25-pdrs from his support group. Despite strong resistance by two German and one Italian infantry battalions, the British infantry succeeded in gaining the northern escarpment. In accordance with the commander's



Defeat of the 7th Armoured Brigade at Sidi Rezegh, 21–22 November 1941

1. 21 November, 0830 hours. KG Stephan attacks from southwest, initially opposed only by 7 H.
2. 21 November, 0930 hours. 7 H retreats after heavy losses.
3. 21 November, 0945 hours. 2 RTR intervenes to block KG Stephan, which is low on ammunition.
4. 21 November, 1000 hours. 6 RTR conducts a costly and futile attempt to reach Ed Duda, but is repulsed.
5. 21 November, 1300 hours. KG Cramer engages 2 RTR but cannot reach the airfield.
6. 21 November, evening. After refuelling and re-arming, KG Stephan moves to Belhamed.
7. 22 November, 0730 hours. KG Stephan advances from Belhamed and swings wide to the west.
8. 22 November, 1400 hours. KG Stephan attacks from the west, with one battalion heading to the airfield and the other to Point 178 to block British reinforcements.
9. 22 November, 1500 hours. The British 22nd Armoured Brigade reaches Point 175 but fails to intervene effectively in the battle.
10. 22 November, 1600 hours. KG Stephan overruns Sidi Rezegh airfield, causing the remnants of the British Support Group to retreat southward.

intent to send a force onward to Ed Duda to link up with the Tobruk garrison, Lieutenant Colonel M. D. B. Lister led B Squadron 6 RTR (Major J. F. Miller) and his regimental headquarters on the trail up the escarpment with about 20–25 Crusaders at around 1000 hours.[65] The thin-skinned Crusaders were not intended for use in the infantry support role, but that is how they were used by Campbell at Sidi Rezegh. Initially, Lister's tanks claimed to have knocked out five German Pz II light tanks and a field gun, but the enemy defence atop the escarpment was not broken. At this point, it is not clear exactly what happened, but Lister's tanks, advancing without infantry support, clearly moved into an anti-tank engagement area and were badly shot up. Lister, Major Geoffrey M. Warren (regimental second in command) and Major Miller were all captured and at least 15 Crusaders were knocked out. The remaining six or seven tanks, almost all damaged, beat a hasty retreat back down the escarpment. The rest of the 6 RTR was gradually whittled down during the afternoon, leaving only 12 Crusaders still operational.[66]

Armoured warfare from the perspective of a driver in an M3 Stuart tank. It is immediately apparent that the driver is in a very vulnerable position in combat and likely to suffer from fatigue from spending all day in his 'hole'. (IWM, E 3445E)

While Campbell was assaulting up the northern escarpment, Davy was ordering Lieutenant Colonel Frederick W. Byass' 7th Hussars to face eastward toward the approaching enemy. Byass had about 40 operational cruiser tanks, supported by F Battery, 4 RHA. Lieutenant Colonel Chute's 2 RTR was re-deploying to support 7th Hussars with another 40 tanks, but would not be immediately available. Kampfgruppe Stephan from 21. Panzer-Division was approaching with about 82 tanks (including 47 Pz III and 13 Pz IV), with Major Werner Mildebrath's I./Pz.Regt. 5 in the lead. The 15. Panzer-Division was also approaching, but about 30 minutes behind von Ravenstein's division.

At about 0830 hours, German artillery opened fire on the 7th Hussars, at a range of about 2,000 metres. Byass deployed his regiment with Major Delme C. G. Seymour-Evans' A Squadron (Crusaders) on the left flank, Major Ralph Younger's B Squadron (A-13 or Mk IVA) on the right and Major John Congreve's C Squadron (A-10s) in reserve. By 0851 hours, both A and B squadrons were on line and engaging the enemy.

Although the German long-range fire was not particularly effective, they used it to create a base of fire while the Panzers manoeuvred for favourable firing positions. The 8.8cm guns from the 3./Flak-Regiment 18 fired 35 rounds and claimed four cruisers destroyed.[67] While Mildebrath's I/Pz.Regt. 5 engaged the 7th Hussars, Major Friedrichs' II./Pz.Regt. 5 tried to flank them to the north, which put heavy pressure on A Squadron. The tanks of both Seymour-Evans and his second-in-command were hit. Lieutenant Colonel Byass ordered Major Congreve to shift his C Squadron to support the endangered left flank, but the German armour came on quickly. Multiple British tanks were hit and all three squadron leaders were soon wounded. German tanks were also hit, but Byass had significantly less fire support than Stephan, and 7th Hussars was on the verge of being overrun. Byass tried to steady his faltering regiment, but around 0930 hours he was killed by a direct 5cm hit on his command tank. The battered remnants of the 7th Hussars, about 14–15 tanks, retreated to avoid complete destruction.[68] Chute's 2 RTR did not arrive until just after 7th Hussars had broken off the action and now faced Kampfgruppe Stephan alone. Rather than engaging the enemy from stationary firing positions, Chute opted to mount a pincer attack with Major Michael J. Woollcombe's B Squadron and Major Mark F. S. Rudkin's C Squadron. The Germans knocked out two cruiser tanks and damaged several others, but Stephan's Panzers had nearly exhausted their ammunition after the hour-long action. Consequently, Stephan decided to temporarily break off the action at 1000 hours in order to replenish his ammunition. However, the supply columns did not arrive until the afternoon and then only delivered one-quarter of a basic load of ammunition, leaving Kampfgruppe Stephan unprepared for further heavy combat.[69]

Oberstleutnant Hans Cramer's Pz.Regt. 8 tried to resume the advance toward the Sidi Rezegh airfield in early afternoon, in hopes of overrunning some of the support group's motor transport. Chute's 2 RTR fought a one-sided action, which succeeded in keeping Cramer's Panzers from taking the airfield, but at the cost of 12 more cruisers. Cramer suffered a few losses, but his main problem was that his tanks had fired off most off their ammunition and he was forced to break off the action to seek resupply, as well. By the end of the day, Davy's 7th Armoured Brigade was reduced to just 20 operational tanks in his three regiments.[70] While some of the damaged tanks would be repaired during the night by the hard-working A and B echelons, it would not be so easy to replace two regimental commanders, four squadron commanders and multiple troop leaders. Both German Panzer-Divisionen still retained most of their combat capability and had not suffered heavy materiel or personnel losses.

It is also noteworthy that the 4th and 22nd armoured brigades failed to lend any support to the 7th Armoured Brigade while it was being hammered at Sidi Rezegh. Cunningham had ordered both brigades to remain in contact with the 15. Panzer-Division, but the German tanks had slipped away at dawn under cover of a brief rain shower. Amazingly, both British armoured brigades mounted a snail-like pursuit that failed to catch up with 15. Panzer-Division or to reach Sidi Rezegh until nightfall. Gott's performance in battle command during much of the day was also incredibly poor, as he failed to direct his scattered brigades and seemed more interested in the movement of the 1st South African division, which was not his responsibility. While Gott seemed oblivious to the developing disaster his division was facing at Sidi Rezegh, Norrie ordered the 5th South African Brigade to move there to provide additional infantry support.

By now, Rommel and Crüwell recognized that they were on the cusp of a major tactical victory at Sidi Rezegh. Rommel ordered Crüwell to attack again with both Panzer divisions the next morning, reinforced by some infantry (Gruppe Knabe) and artillery from Sümmermann's Division z.b.V. At 0730 hours on 22 November, von Ravenstein's 21. Panzer-Division attacked south-west from Belhamed. Kampfgruppe Stephan swung around to the west of the airfield with 45 medium tanks, while S.R. 104 mounted a fixing attack against Campbell's support group. The British position was extremely vulnerable and there was no good reason to conduct a die-in-place mission on an airstrip littered with burning wreckage, but that is what Brigadier 'Jock' Campbell decided was the correct choice.

Campbell ordered Major Mark F. S. Rudkin, now in command of the remnants of the 2 RTR (12 Cruisers), to attack Kampfgruppe Stephan's approaching Panzers.[71] Campbell said, 'See that, attack – and I like speed.' Campbell then jumped into his staff car and decided to lead Rudkin's tanks, waving a red signal flag. Kampfgruppe Stephan sighted Rudkin's Crusaders and opened fire at a range of about 1,200 metres. Rudkin halted his squadron in order to return the fire, but Campbell angrily demanded that they continue to advance. Rudkin later stated that 'one of our tanks had its gun damaged and reversed about 200 yards to put it right. Brigadier Campbell drove over to it, got out of his car, and, livid with rage, threw stones at it, shouting at it to get back into action.' After about five minutes under heavy fire, Rudkin pulled his squadron back 200 metres to avoid destruction. Incensed that the tankers had not attacked the much larger German armoured formation, Campbell ordered Rudkin to hold his position 'at all costs' and told him that his artillery would fire on the British tanks if they withdrew even another yard. When Rudkin objected to this, Campbell said that 'That's what you are soldiers for – to die.'[72] Major Rudkin held his position for a while, claiming six German tanks knocked out, but he lost 11 of his own.

Temporarily, the German Panzer attack from the west was halted, but the German infantry was encroaching upon the airstrip from the north and German artillery was pounding the flat valley. Around 1000 hours, Gott ordered the 4th and 22nd armoured brigades to proceed north, but instead of going directly to Sidi Rezegh, he ordered them to head to Point 175, which was about 9 kilometres east of the airfield. Both brigades opted to refuel en route, and their approach to the battlefield was slow and meandering. Brigadier Scott-Cockburn managed to get lost for a while and then his vehicle became stuck in soft sand, so his brigade moved without him. Amazingly, Gott made no effort to proceed directly to Sidi Rezegh to direct the battle. In contrast, Rommel was observing the action from the northern escarpment and intervening when necessary.

By 1300 hours, von Ravenstein was prepared to mount a co-ordinated attack on the airfield. The remaining British tanks were on the west side of the airfield, while Campbell had the two 25-pdr regiments (60th RA, 4 RHA) on the edge of the airfield and his anti-tank guns (3 RHA) on the east side of the airstrip. Kampfgruppe Stephan advanced with his tanks, supported by a battery of 8.8cm Flak guns, a battery of 10.5cm field guns in direct support and a battalion of 15cm howitzers in general support. Campbell ordered what was left of the 2 RTR and 6 RTR to stop this advance, but this time the Germans Panzers came on quickly. The British 25-pdrs and 2-pdrs around the airstrip engaged the German tanks, but the situation rapidly disintegrated. More British tanks were knocked out, as well as artillery. Still, the British gunners put up a hard fight, with ten guns from the 60th Field Regiment RA being destroyed. When the German tanks reached the wreckage-littered airfield, Campbell's support group fell apart. Then, one company of German tanks swung north and took the 1st Battalion KRRC from behind. Caught unexpectedly from behind by tanks, most of the battalion surrendered and only 55 personnel made it back to friendly lines. A great deal of motor transport and maintenance personnel from both the support group and the 7th Armoured Brigade were lost in the pell-mell retreat from the Sidi Rezegh airfield.

Just as Campbell's support group came under attack, the lead elements of the 22nd Armoured Brigade appeared on the southern escarpment near Point 178. Despite the losses at Bir el Gubi, the brigade still had a total of 79 operational tanks. The 3 CLY reached Point 178 just before the German attack began and spent the next 90 minutes refuelling while watching the battle in the distance. According to the 3 CLY War Diary, 'we were ordered by brigade not to become involved in the 7th Armoured Brigade action'.[73] Twice, Davy sent liaison officers to the 22nd Armoured Brigade to appeal for support, with no reaction. Finally, as British vehicles streamed south from the airfield around 1600 hours, the 22nd Armoured Brigade slowly moved to engage the enemy armour. Kampfgruppe Stephan sent Major Friedrichs' II./Pz. Regt. 5 to block the 22nd Armoured Brigade from interfering with the destruction of Campbell's command. A single squadron from the 2 RGH and one from the 3 CLY engaged Friedrich's Panzers from a distance, claiming about seven kills.[74] In return, the 8.8cm Flak guns with Kampfgruppe Stephan destroyed two Crusaders from 2 RGH, and 3 CLY had seven of its tanks hit. As darkness began to fall on the battlefield, which was already obscured by smoke and blowing sand, the 22nd Armoured Brigade disengaged. Davy's 7th Armoured Brigade, reduced to just 11 tanks, fell back upon the positions held by the 5th South African Brigade on the southern escarpment.[75]

Although the British infantry, tankers and artillerymen fought bravely at Sidi Rezegh, they were badly let down by their commanders. Davy essentially ceded control of his tanks to Campbell, who did not have a clue about how to employ them properly. Campbell's behaviour on the battlefield bordered on the imbecilic, rushing to and fro, trying to direct individual tanks and guns. He seemed to have no inclination to use a radio for command and control (even though his artillery units possessed good communications links), or to demand air support, or even to pass accurate intelligence reports about the action to Gott, Norrie and Cunningham. Instead, the meagre reporting coming from British units at Sidi Rezegh suggested that the Germans lost nearly half their armour, while omitting the fact that 7th Armoured Brigade and the support group were on the verge of annihilation. Far away from the front, Cunningham thought 7th Armoured Division had defeated the DAK's armour. Normally, Victoria Crosses are awarded for gallant and successful defensive actions, not actions where the objective is lost and most of one's unit is destroyed or captured. Nor do brigadiers normally receive VCs.; only three have ever been awarded to general officers (two in the First World War and one in the Second World War). Nevertheless, Campbell – who was a colourful favourite among the old Western Desert crowd – was awarded the VC, probably as a means to conceal the disaster to British arms that occurred on his watch.

Gott's performance remained awful throughout the day, allowing events to spin out of control. It is the duty of a senior officer to try and reduce chaos on the battlefield, rather than adding to it. Likewise, Brigadier Scott-Cockburn failed to follow orders, failed to march to the sound of the guns and left 7th Armoured Brigade to its fate. Brigadier Gatehouse, who was the most experienced senior armour leader in 7th Armoured Division, did not have a good day either. His 4th Armoured Brigade spent much of the day refuelling and skirmishing with a German screening force. Consequently, the 4th Armoured Brigade did not reach the area east of the Sidi Rezegh battlefield until after dark. Gatehouse had no idea where either friendly or enemy forces were in relation to his brigade, so he left his brigade headquarters to find Gott (apparently forgetting the lesson from O'Connor's capture that senior officers should not be driving around in the desert in staff cars when the enemy is nearby).

As fate would have it, the 4th Armoured Brigade went into night laagerr very close to the 15. Panzer-Division, which Crüwell had detached to make a sweep east of Sidi Rezegh. The British were aware that vehicles were moving nearby, but from which side? Around 2000 hours, Brigadier Douglas A. Stirling (who was commander of the 1st Armoured Brigade), imprudently decided to fire three flare shells to shed some light on the situation. It turned out the nearby vehicles were tanks from Major Günther Fenski's I./Pz.Regt. 8. Fenski boldly drove into the

British laager with his own Pz Bef and one other Pz III, but ordered the rest of his battalion and some Kradschützen to quickly encircle the huddled vehicles. The British were stunned to see German tanks and troops suddenly appear in their midst; some fought, some surrendered and some ran. Most of Lieutenant Colonel Dick S. Cripps' 8th Hussars was captured, including 35 Stuart tanks (the British managed to set three on fire at the last moment); six tanks escaped under fire. Fenski ordered some of tankers to dismount and take control of the prisoners, but three NCOs were killed by the British before resistance ceased. Altogether, 176 British personnel and 19 other vehicles were captured, including most of the 4th Armoured Brigade headquarters. Even worse, the Germans captured the brigade's four long-range radios and their code books intact, which compromised communications within XXX Corps at a critical moment. Soon after this, some British units noticed unusual radio messages purporting to be from brigade, attempting to get units to report their location and status.[76] Brigadier Gatehouse went to the 3 RTR command post and tried to rally his brigade, which was reduced to just 77 operational Stuart tanks.[77]

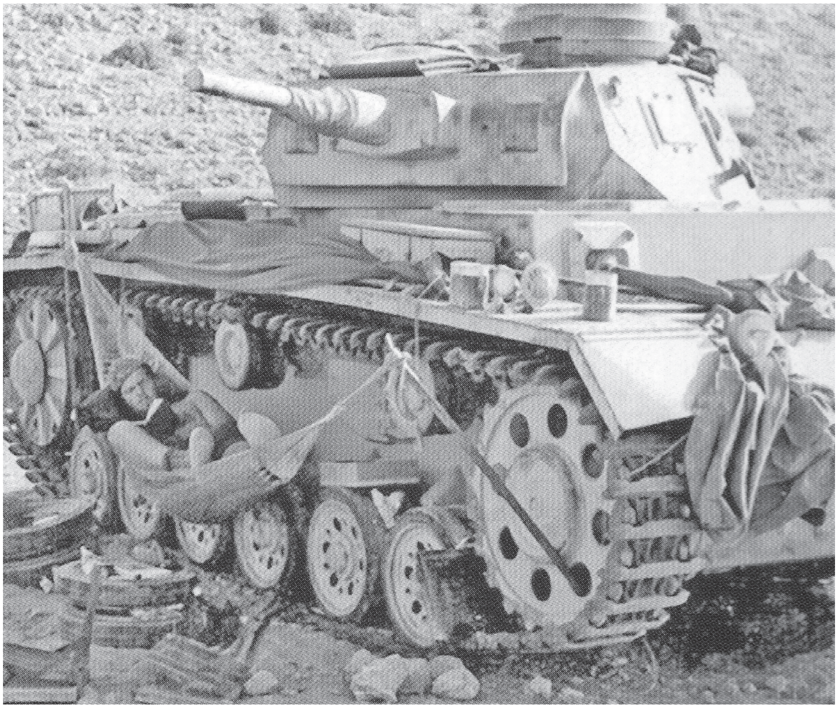
By nightfall, it was clear that not only had the DAK inflicted serious losses on the 7th Armoured Division, but the British commanders were incapable of coordinating their armoured brigades against a single objective. The 7th Armoured Brigade was reduced to just ten tanks and 22nd Armoured Brigade had 34 tanks.[78] Although the fuel and ammunition situation was tight, both Panzer divisions still had adequate combat strength. Kampfgruppe Stephan (Pz.Regt. 5) still had 39 operational medium tanks (32 Pz III and seven Pz IV), while Cramer's Pz.Regt. 8 had 84 operational medium tanks (68 Pz III and 16 Pz IV). Losses on 22 November amounted to 12 tanks for Pz.Regt. 5 and 19 tanks for Pz.Regt. 8, including a total of ten *Totalausfälle* (one Pz II, seven Pz III and two Pz IV).[79]

One other significant armour action occurred on 22 November, further east at Sidi Omar. The XIII Corps had been remarkably slow at getting into action and was not ready to begin a set-piece attack on the Axis frontier defences until the sixth day of Operation *Crusader*, by which point the 2nd New Zealand Division had out-flanked the enemy. By the night of 21 November, the New Zealanders had taken Sidi Azeiz and Fort Capuzzo, thereby isolating the frontier defences.[80] Lieutenant General Alfred Godwin-Austen, commander of XIII Corps, then ordered the 4th Indian Division to attack the fortified box at Sidi Omar and, once this was taken, Allied troops could proceed to roll up the Axis line. The Axis position at Sidi Omar consisted of two separate strongpoints known as Omar Nuovo and Libyan, each of which was defended by a reinforced Italian infantry battalion from the 'Savona' Division, plus Italian artillery and one battery of four German 8.8cm Flak guns. Both positions were heavily fortified hedgehogs, prepared for all-around defence and protected by approximately 100,000 mines (anti-tank T-mines and anti-personnel S-mins).[81] Up to this point in the desert war, Commonwealth forces had not yet attacked such a strong defensive position.

Two infantry battalions from the 7th Indian Brigade were assigned to conduct the assault, supported by two squadrons of Matildas from Lieutenant Colonel Aleck R. Martin's 42 RTR and one squadron of Matilda's from 44 RTR. The infantry and tanks moved around the enemy's open flank before dawn on 22 November, to an assault position 5 kilometres north of the Axis positions. Around 1130 hours, the RAF attacked both positions, dropping 10 tons of bombs from 6,000 feet, but the accuracy was poor due to very effective enemy anti-aircraft fire, which shot down six aircraft. Then at 1200 hours, the 4th Indian Division's artillery (52 25-pdrs, eight 6-inch howitzers and four 4.5-inch guns) began an extensive preparation that fired nearly 8,000 rounds at the Axis positions.[82] While the barrage – which included smoke shells – was still in progress, the 42 RTR began its advance, with Major Ronald M. Rawlins' A Squadron and Major Laurence C. Ashton's B Squadron moving in two lines abreast. Some of the British infantry advanced in universal carriers, but most followed on foot, about 75–100 metres behind the tanks. All went splendidly at first, as if on manoeuvres. The plan was to take Omar Nuovo first, then pivot east to take Libyan Omar by dusk.

Unfortunately, the British thought they could emulate their earlier success at Nibeiwa by attacking from behind, but the enemy had anticipated this by laying minefields in this area. The Matildas ran into the minefield and 11 were quickly immobilized by anti-tank mines. Sitting helpless about 300–400 metres from the enemy positions, they were easy prey for the battery of 8.8cm Flak guns, which had not been suppressed by the artillery preparation. With the tanks stalled and milling about in the minefield, the Royal Sussex Battalion pressed on ahead without tank support and suffered heavy casualties from enemy machine-gun fire. Eventually, the British found a small gap in the minefield and some tanks were able to pass through it. By 1530 hours, most of Omar Nuovo had been captured and the 7th Indian Brigade tried to shift its depleted forces to make a go for Libyan Omar. However, engineers did not have an opportunity to clear (or even identify) enemy mines and more tanks were knocked out running into unexpected minefields. After a brief attempt, the assault on Libyan Omar was broken off until the next day. The three squadrons of Matildas from 42 RTR and 44 RTR had lost 37 of 48 tanks committed and personnel losses totalled 48 killed and 30 wounded.[83]

The 7th Indian Brigade did succeed in capturing Libyan Omar after another day of fighting and took 3,600 prisoners, but this was an expensive victory. Despite ample fire support, an attack conducted in accordance with British doctrine for the use of infantry tanks suffered crippling losses in armour from an enemy that was isolated. The use of smoke indicated greater respect for enemy defensive fire, but the introduction of large-scale mine barriers caught the British by surprise. At this point, the British Army had no electronic mine detector (a Polish officer was on the verge of creating one, soon after *Crusader* ended) and the Royal Engineers were poorly equipped to deal with mine barriers. On the battlefield, British tanks also had very limited ability to request artillery support to suppress threats like the 8.8cm Flak guns, and



A German Pz III crewman, reading in the shade of his vehicle. Tankers are very comfort-oriented and innovative, such as using the rear wheel sprockets as mounting points for a hammock. (Author's Collection)

counter-battery fire was another skill that had been allowed to deteriorate during the inter-war period. Forward observers were present, but often unable to correct fire missions due to dust and smoke on the battlefield. As a result, the British conduct of combined arms warfare was undermined by a myriad of procedural and technical glitches which should have been identified and corrected in training prior to Operation *Crusader*.

Although Cunningham was still under the false illusion that the fighting had gone well at Sidi Rezegh, Rommel, who was on the spot, knew better. On the night of 22/23 November, he issued an order that the next morning, the DAK would launch a concentric attack to encircle and destroy the British on the southern escarpment, supported by the 'Ariete' Division from the south. Mussolini personally ordered that Gambara's CAM would be under Rommel's control for this decisive action.[84] Generale Balotta decided to detach a battlegroup under his deputy, Generale di Brigata Ismaele di Nisio, to support the German operation. The di Nisio column consisted of four tank companies with about 80 M13/40 tanks, a Bersaglieri truck-mounted infantry battalion and supporting artillery and anti-tank detachments.[85] Normally Rommel had avoided conducting all-out attacks because Panzergruppe Afrika could not afford heavy losses, but now he was willing to commit all his armour and mobile infantry to battle in the hope of achieving a decisive result. Crüwell ordered Kampfgruppe Stephan to join the 15. Panzer-Division and began moving south before dawn on 23 November, swinging wide to the east of the British. Pz.Regt. 5 still had 39 operational medium tanks and Pz.Regt. 8 had 84 operational medium tanks. Once the Panzers were in place south-east of the enemy, the rest of the 21. Panzer-Division would conduct a fixing attack from the north and 'Ariete' would attack from the south-west.

Norrie had ordered Brigadier Campbell to defend the southern escarpment with the battered support group (reinforced with 2nd Battalion Scots Guards from 4th Armoured Brigade), supported by the 5th South African Brigade. The 22nd Armoured Brigade (34 tanks), now under Lieutenant Colonel William G. Carr, was assigned to protect Campbell's western flank. Gatehouse's 4th Armoured Brigade (77 tanks) was ordered to protect the eastern flank, although communications with the brigade were sporadic after the loss of its headquarters. Davy's 7th Armoured Brigade, reduced to just ten very beaten-up tanks, was ordered to pull back to the south.[86] Gott finally had most of his division assembled south of Sidi Rezegh, but he had been forced onto the defensive and had no real tactical plan at this point. In order to lend some help to Norrie's XXX Corps, the 2nd New Zealand Division sent its 6th Brigade and the 8 RTR west toward Point 175. By chance, the New Zealanders and C Squadron of 8 RTR overran the DAK headquarters in a *wadi* near Bir el Chieta around 0615 hours – now it was the Germans' turn to have their communications disrupted.[87] The capture of the DAK headquarters also prevented Rommel from overseeing Crüwell's attack.[88]

Thick ground fog hung over the Sidi Rezegh sector on the morning of 23 November, reducing visibility and muffling sounds. Pz.Regt. 5 was supposed to be tucked in close on Pz.Regt. 8's left flank, but Kampfgruppe Stephan got a late start and Cramer decided to start the advance without them. Second Lieutenant Alexander A. van Niekerk of the 4 SAACR was the first to spot Kampfgruppe Cramer moving southward, but when he reported his sighting it was not accepted as credible. Cramer advanced in two *Breitkeil* (broad wedge formations), with Major Günther Fenski's I./Pz.Regt. 8 in the lead.

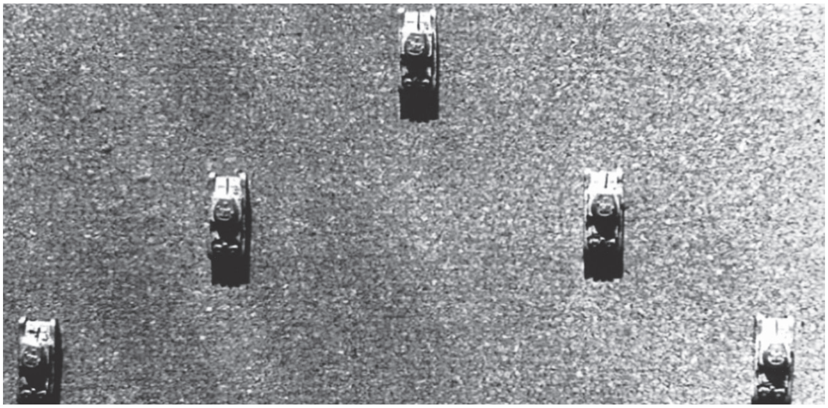
Around 0800 hours, Fenski's Panzers unexpectedly encountered a huge cluster of more than 100 British motor vehicles, some still in the process of moving out of laager. Many of these vehicles were part of B-echelon units. Due to the fog, the lead German tanks actually drove into the British formation, which was a mixture of 7th Support Group and South African vehicles. Major Fenski was hit in the head by machine-gun fire and killed instantly. Oberstleutnant Cramer's command tank was hit by anti-tank fire, but he managed to extricate himself before his tank was immobilized. Hauptmann Johannes Kümmel took charge of the Panzer-Abteilung and directed his tanks to begin shooting up the British motor vehicle park, which caused support units to bolt for safety. Ten Stuarts from 3 RTR were in the vicinity and intervened against Pz.Regt. 8. At least one Pz III was knocked out at point-blank range by 37mm fire. A wild, close-range melee ensued, but Crüwell ordered Cramer to break off the action and continue his mission. While the intervention of the 3 RTR helped saved the Support Group from being destroyed, five of the regiment's Stuarts ran out of fuel right after the action, indicating the chaos inflicted upon 4th Armoured Brigade's resupply operations due to the loss of its headquarters staff.[89]

It took some time for Pz.Regt. 8 to break off the action with the British support troops and re-form. By 1100 hours, Pz.Regt. 5 had caught up and Crüwell now had well over 100 tanks in hand. The Italian di Nisio column from the 'Ariete' Division linked up with Oberst Cramer's Pz.Regt. 8 south of Sidi Rezegh at 1235 hours. Following the morning action, Gott had ordered Brigadier Campbell and the remnants of the 7th Armoured Brigade south to re-form near Bir er Reghem. He also directed the South Africans to improve their perimeter defences, but gave conflicting advice based on his assessment of enemy likely intentions. Gott told the South African brigade commander that the Panzer attack on the support group was likely a feint since the German tanks had retreated, rather than press their advantage. He stated that the main German attack was still to be expected from the north, but they might launch a supporting attack from the south or east as well. Based on Gott's confusing guidance, the South African brigade re-positioned its artillery and anti-tank guns, with 21 of 35 2-pdrs and 14 of 48 field guns facing south. Due to the rocky nature of the terrain, the 5th South African Brigade did not dig in and most of its infantry was oriented northwards. Around 1400 hours, Gott left the South Africans and proceeded east, intending to round up the disorganized 4th Armoured Brigade.

Crüwell's efforts to organize his Panzers for a decisive attack were hindered by persistent 25-pdr artillery fire from the South Africans and some boggy terrain, but by 1500 hours he was ready. Kampfgruppe Stephan was deployed on the right, Kampfgruppe Cramer in the middle and di Nisio's Italian tanks on the left. Two battalions of truck-mounted infantry would follow each Panzer regiment and each regiment was also supported by a battery of 10.5-cm field guns and a Panzerjäger detachment. Incredibly, the South Africans were able to observe this mass of enemy armour deploying about 6,000 metres south of them, but were reluctant to use too much artillery ammunition because they were running short. Nor was any effort made to request an RAF air strike on this lucrative target. Prior to his attack, Crüwell directed his two artillery batteries to begin bombarding the South African positions, which were coordinating with artillery strikes from the north (Gruppe Böttcher). Around 1515 hours, the German Panzers began advancing toward the 5th South African Brigade.

The South African 25-pdrs now fired in earnest and, as the distance closed, the 2-pdr anti-tank guns joined in. Although the German tanks could move through the artillery barrage with relative impunity, the truck-mounted infantry suffered heavy losses and both battalion commanders from the Schützen-Regiment 115 (S.R. 115) quickly became casualties. The 2. Kompanie in S.R. 115 was the only infantry unit in the DAK equipped with Sd.Kfz. 250 half-tracks. By 1530 hours, Kampfgruppe Cramer's Panzers made a frontal attack directly into the South African positions and Hauptmann Johannes Kümmel's I./Pz.Regt. 8 managed to reach the gun line, but at the cost of a dozen of his tanks disabled. However with their infantry support pinned down by defensive fire, Cramer's Panzers were in an awkward position, with British 25-pdrs engaging his tanks at nearly point-blank range. Furthermore, Kampfgruppe Stephan had drifted off to the right and got tangled up with some British tanks to the east, so it was not in a position to lend immediate support. Adding to Cramer's difficulties, German tactical radio communications broke down during the action, which reduced the ability of Crüwell to co-ordinate the attack. British radio communications were also in a poor state, but Lieutenant Colonel William Carr, now in command of the 22nd Armoured Brigade, was able to shift about 20 of his tanks to meet the German Panzers. Jago's 3 CLY sent eight Crusaders to attack Hauptmann Wolfgang Wahl's II./Pz.Regt. 8, but lost four in a brief action and retreated. Carr was able to get small numbers of tanks from the 2 RGH and 4 CLY into the fight, but these pin-prick counter-attacks could not stop the mass of German armour. Carr lost ten of his 30 tanks and most of the remainder were damaged.

With Cramer's Panzers isolated and taking a heavy pounding from all sides, this was the chance to destroy a large portion of the DAK's armour, but Gott's 7th Armoured Division was now unable to muster sufficient combat power. Gatehouse's 4th Armoured Brigade, the only armoured brigade with any real strength left, was off to the east, in a confused state. Although the South African gunners inflicted tremendous damage on Cramer's tanks, they were running out of ammunition. Most of the South African 2-pdr guns were mounted in portee (on trucks) rather than dug in, which made them vulnerable to machine-gun fire. Gradually, by 1700 hours, many of the guns were either knocked out or had exhausted their ammunition. Soon afterwards, the remaining German tanks over-ran the South African brigade headquarters. German infantry were also closing in from the north and Kampfgruppe Stephan finally struck a deathblow into the south-east corner of the South African perimeter, which caused a collapse. Once the defence folded, Allied vehicles and troops on foot tried to escape to the east or south, but even the



A platoon of five Italian M13/40 tanks in wedge formation, seen from above. There is ten metres or less between each tank, which is extremely close for a wedge formation. (Author's Collection) guns and tanks that survived were left in scattered fragments. Superficially, Crüwell had won a great tactical victory at Sidi Rezegh, but the losses in armour and personnel made it a Pyrrhic victory. In particular, Cramer's Pz.Regt. 8 lost nearly half its tanks, with 19 *Totalausfälle* and another 36 damaged. Stephan's Pz.Regt. 5 also suffered heavy losses, including 7 *Totalausfälle* and 14 damaged. Altogether, the DAK had lost 26 Panzers destroyed and 50 damaged out of 174 committed; 43 per cent of Rommel's armour had been put out of action to destroy a single infantry brigade.[90] Even worse, many of the damaged tanks would never be repaired, leaving the DAK with around 75 operational medium tanks. The Italian di Nisio battlegroup was only lightly engaged on the left flank, suffering two M13/40s destroyed and three others damaged. While the Germans were very critical of di Nisio's performance, he had accomplished his mission at modest cost. Norrie's XXX Corps was left with about 70 operational tanks, but scattered in five different groups.[91]

Although the 8th Army had made some serious mistakes at Sidi Rezegh, the German performance, particularly on 23 November, was far from exemplary. Crüwell's idea of a flanking manoeuvre followed by a combined arms concentric assault was sound, but poorly executed by Cramer, who essentially conducted a tank charge into the enemy's defensive positions. The South African artillery quickly separated the German truck-mounted infantry from their tanks, allowing the anti-tank gunners to inflict very heavy losses on the unsupported tanks. Photographic evidence indicates many German tanks were knocked out at very close range, often with flank shots. Furthermore, the decision to conduct an assault with truck-mounted infantry into an alert defence in broad daylight was akin to a Balaklava-style action and not in accord with German tactical doctrine. Indeed, had the South African brigade been dug in, as the Italians had been at Bir el Gubi, Cramer's regiment would almost certainly have been repulsed.

Despite the destruction of the 5th South African Brigade, the day ended on another sour note for the DAK. The New Zealand 2nd Division had continued to push west into the vacuum left by the absence of the German armour and the 4th New Zealand Brigade and a squadron of Matildas from 44 RTR succeeded in reaching Gambut airfield at the same time Crüwell was beginning his attack. A large part of the DAK's fuel dumps, as well as the Panzer-Werkstatt Kompanie for 15. Panzer-Division, were located near Gambut and at risk of being overrun.[92] However, Hauptmann Georg Briel formed a mobile *Kampfgruppe* based on his Flak battalion, equipped with 2cm Flak guns on halftracks (Sd. Kfz. 10/4), augmented by three tanks from the repair workshop and two 5cm Pak 38 guns. Through an aggressive defence, Briel managed to prevent the New Zealanders from overrunning the DAK's supply units and the British failed to note the importance of this area to Rommel's armoured units. Fortunately for Briel, the New Zealanders mistook his self-propelled Flak guns for tanks and did not press the attack.[93] Thus, through one of the weird ironies of war, both sides were attacking each other's vital support units at nearly the same time.

Meanwhile, the 6th New Zealand Brigade continued to push westward with the 8 RTR, intending to link up with the 5th South African Brigade. A German blocking position on Point 175 east of Sidi Rezegh was held by two battalions of Infanterie-Regiment 361 (Inf.Regt. 361). Not expecting heavy resistance, the New Zealanders mounted a set-piece attack against Point 175 at 1200 hours, supported by Major Peter N. Veale's C Squadron 8 RTR. This action was essentially the baptism of fire for the new Valentine tank (Infantry Mk III), and it did not go well. Initially, the New Zealanders committed only a single infantry battalion, which suffered heavy casualties from German machine-guns and mortars. Veale's tanks advanced in two waves, with a total of 16 Valentines. It is unclear from available sources exactly what anti-tank assets the Germans had on Point 175, but they were enough to begin taking a steady toll of Veale's tanks. Just as the New Zealand infantry attack bogged down, three German tanks (probably strays from Kampfgruppe Stephan) launched a counter-attack from the south and inflicted considerable chaos. After a protracted action, the New Zealanders managed to occupy part of Point 175, but their infantry suffered heavy losses and Veale's C Squadron lost 12 of 16 Valentines and 21 crewmen (six KIA).[94] A large part of the problem at Point 175 appears to have been the lack of prior infantry-tank training by the New Zealand infantry units and an under-estimation of enemy defensive capabilities.

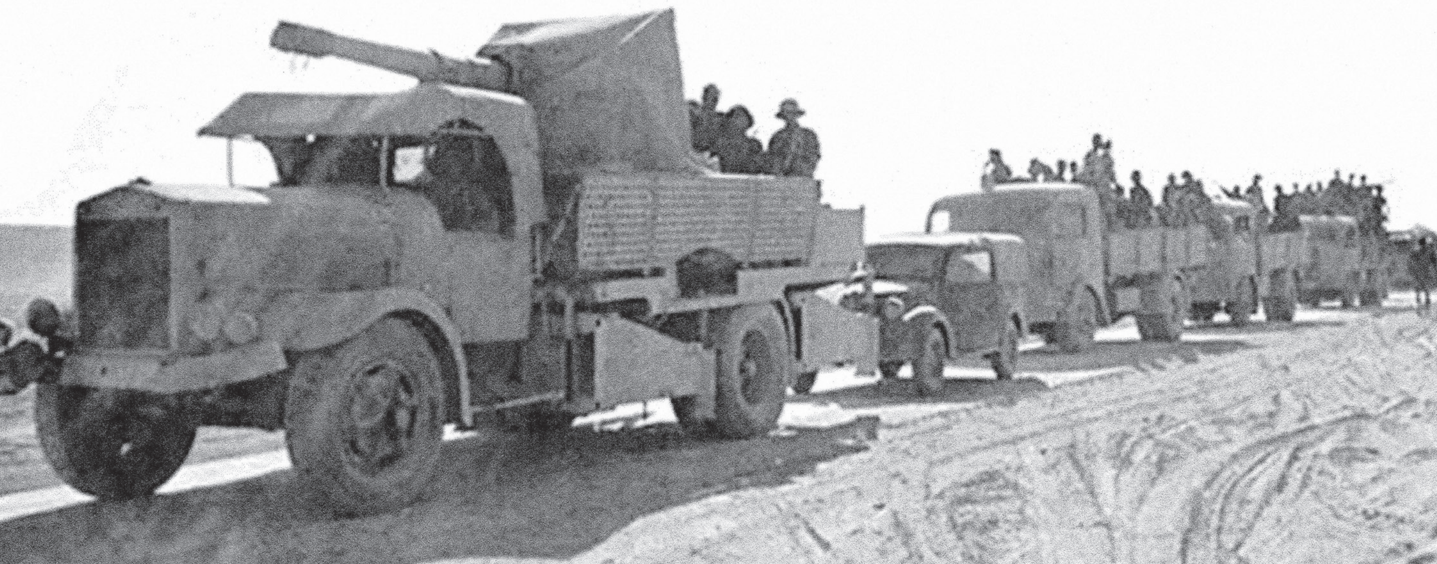
Rommel remained largely ignorant of the day's events, since he had become involved with the action around Point 175 and was not in radio communication with Crüwell. The loss of radio trucks when the DAK command post was over-run by 8 RTR caused a ripple effect of disruption in German communications that had a profound effect on the outcome of Operation *Crusader*. Rommel spent the night of 23/24 November at Ravenstein's command post and received a quick synopsis of the defeat inflicted on the 5th South African Brigade. Based on this fragmentary information, Rommel came to believe that a large portion of the 8th Army had been destroyed and one good shove would send the remainder scurrying back to Egypt. It is likely his experience of Allied disintegration in France in 1940 coloured his assessment of the situation. Based on this hunch – and with no input from staff or his subordinates – Rommel made one of the most momentous operational decisions of his military career. Around 0400 hours on 24 November, Rommel personally ordered Oberstleutnant Stephan to get his Panzers moving east along the Trigh el Abd toward Sidi Omar as soon as possible.[95] Apparently, Rommel bypassed Ravenstein and simply began giving direct orders to units in the 21. Panzer-Division to follow, as well. Rommel's hastily improvised plan was based on the assumption that if he conducted a rapid armoured sweep against the 8th Army's vulnerable line of communications, it would precipitate a collapse in morale. Rommel's ensuing 'dash to the wire' was based on the classic Jomini concept of warfare in the 1830s, which was itself based on Napoleon's 'Ulm manoeuvre' of 1805 – the idea that manoeuvre in itself could be decisive without battle. However, neither Napoleon nor

Jomini had to worry about supplying their advancing troops with thousands of litres of fuel every day and the myriad of other essential items required to keep a modern mechanized army in motion. At this crucial moment, Rommel's decision-making was based on outdated concepts and an insouciant disregard for details.

Nor did Rommel bother to inform Crüwell of his intentions, but around 0600 hours the commander of the DAK arrived at von Ravenstein's headquarters and discovered that his formations were being assigned new missions. Rommel peremptorily informed Crüwell that he intended to head eastward to Sidi Omar with the entire DAK and the Italian CAM. Crüwell was aghast at this course of action and tried to put forth sound reasons to adopt a more sensible approach. First, he pointed out that both Panzer divisions had not refuelled overnight due to the disruption caused by the New Zealanders to the DAK's own line of communications and that there were over 80 German tanks on the battlefield that needed to be recovered and repaired. Second, Crüwell pointed out that the British 7th Armoured Division had been hurt, but not yet destroyed. He recommended that once the DAK had restored some of its combat capability, it should be used to complete the destruction of Gott's division, then turn to deal with the New Zealander's near Gambut. Oberstleutnant Siegfried Westphal (the Panzergruppe Ia or operations officer) and von Mellenthin (intelligence officer) also recommended keeping the DAK near Tobruk to prevent the New Zealanders from linking up with the Tobruk garrison.[96] Rommel brusquely brushed off Crüwell as 'unimaginative'; he never paid much heed to what staff officers had to say, since he was a man of action, and they were not. When the staff raised the critical issue of fuel for the Panzers, Rommel casually said that he would replenish the DAK from captured British fuel dumps, even though he did not know where these were located.[97] Instead, he gave some quick verbal instructions to Westphal and told him that he would be back in 24 hours or so, then left. Although Rommel mentioned that he wanted the Italian CAM to participate in the advance, no detailed instructions were provided to Gambara. In his haste to get going, Rommel left his Kfz. 17 radio truck behind, which was mired in soft sand – thus he went off into the blue without long-range radio communications.

Rommel had been a crackerjack light infantry battalion commander at Mount Matajur in 1917, but as a Panzergruppe commander in 1941, he proved to be a disaster. While intuition has always been necessary for effective battlefield command, it has rarely been an effective substitute for sound planning. Modern warfare is a team effort and the Wehrmacht in particular had gone to great lengths to train competent, professional staffs – it was indeed the backbone of the German way of war – which Rommel chose to abandon in favour of his own peculiar one-man style. He simply disregarded any intelligence or logistic factors which threatened his mental picture of the situation – which is the mark of a terrible commander. Despite his prodding, the DAK was in no shape to conduct a major advance at dawn. Ravenstein's 21. Panzer-Division hastily refuelled from its own limited reserves and was not ready until after 0900 hours.[98] At 1000 hours, Rommel, in his captured British command vehicle, personally led the vanguard of Kampfgruppe Stephan eastward. However, the 15. Panzer-Division did not begin moving until around 1230 hours and the Italian 'Ariete' Division not until 1300 hours.[99]

Meanwhile, the morning of 24 November found Cunningham reacting to the news of the defeat at Sidi Rezegh. Based on initial reporting from Norrie, which was quite sketchy, it was clear that XXX Corps had lost a great deal of its armoured strength. Cunningham was apparently told that XXX Corps only had 44 operational tanks remaining (the actual number was 70), whereas the DAK was thought to still have 120 tanks (actual number 93).[100] Yet Cunningham was not informed that many of the non-operational tanks could be repaired within 24 hours, thereby restoring some armoured capability. Confronted with the possibility that the enemy might now possess better than 2-1 numerical superiority in tanks, Cunningham now began to doubt that Operation *Crusader* could continue. By using a simplistic bean-counting approach to tank warfare and forgetting his large superiority in artillery, infantry, air support and logistics, Cunningham concluded that it was no longer possible to defeat Rommel's forces. At a mid-day conference at XXX Corps, Cunningham openly mentioned the possibility of breaking off the offensive and falling back to Egypt, but both corps commanders and his chief of staff opposed this decision. According to some sources, Cunningham insisted on a withdrawal to Egypt, but no formal order was ever issued.[101] To his credit, Cunningham was unwilling to make the decision on his own and requested that Auchinleck come to his command post near Maddalena to discuss the situation. According to Corelli Barnett, who openly sought to promote Auchinleck's reputation as a commander, Cunningham was 'a spent man', but this conclusion is rather nonsensical since unlike other commanders facing defeat – like Paulus or Percival – he was not reduced to ineffectual apathy.[102] Cunningham's basic problem was not that he was spent, but that like many other senior British infantry officers of this period, he lacked the training, experience and enthusiasm to make sound judgements about



In order to partly redress their limited anti-tank capability, the Italians began mounting heavy artillery pieces on some of their large trucks. The 'Ariete' Division was provided with two batteries of 102/35 naval guns mounted on Fiat 634N trucks. (Author's Collection)

DAK reconnaissance reports watch for signs of an Allied offensive. Rommel chose to ignore the signs that the 8th Army was planning a major effort to relieve the siege of Tobruk. (Author's Collection)

armoured operations and thus sought counsel from others. When it came to tanks, he was awkward and unsure of his ability to command, which even in the post-war world was still a common angst afflicting many light infantry leaders.

Adding to Cunningham's mental discomfiture, the lead elements of Kampfgruppe Stephan appeared near Norrie's XXX Corps after noon, which caused Cunningham, Norrie and Gott to scatter.[103] The sudden appearance of German tanks near Gabr Saleh also threw many of the British support units into great confusion, but Rommel ordered the German column to bypass them and keep heading east. Fortunately for the 8th Army, Rommel also bypassed some of the vital supply and maintenance areas south of Gabr Saleh, which were necessary for reconstituting the 7th Armoured Division. Furthermore, the German columns heading toward the border became extremely stretched out, over at least 70 kilometres, which rapidly dissipated their combat power and their ability to communicate. While the support units fled, elements of Gatehouse's 4th Armoured Brigade held their ground. Although the brigade was still scattered and low on fuel and ammunition, bits and pieces of the 3 RTR and 5 RTR were in a position to strike at Rommel's passing columns. Late in the afternoon, a group of seven Stuarts from C Squadron, 3 RTR under Lieutenant Robert Crisp and five Stuarts from 5 RTR spotted a large German motorized column moving south-east along the Trigh el Abd. Observing the German column from hull-down positions, Crisp was amazed not only at the length of the column – which consisted of infantry and artillery – but at the fact that it was not escorted by enemy tanks or armoured cars. Since there was no enemy armour about, the order was given for all 14 Stuarts to charge on line and attack the column. Under these conditions, the Stuarts were the perfect tank for the job, as they barrelled toward the enemy motorized column firing their machine-guns. The German column scattered in all directions, but many trucks were destroyed and two 8.8cm Flak guns

A Crusader tank passes a burning German Pz IV tank, late November 1941. The British managed to replace some of their losses during the battle, but the Afrika Korps was gradually reduced through a battle of attrition. (Author's Collection)

were captured. The Stuarts also scattered, chasing individual German vehicles.[104] The 5 RTR managed to destroy a number of trucks and take 40 prisoners.[105] Crisp's account, while vividly written, omits mentioning that some German anti-tank artillery was able to get into action and knock out at least three Stuarts and that the chase ended when most of the remaining British tanks ran out of fuel.[106]

Although many accounts describe the British 7th Armoured Brigade as 'destroyed' at this point, Major George F. Yule led a composite squadron of 15 cruiser tanks from the 2 RTR. Yule harassed the 15. Panzer-Division as it passed by, inflicting some damage at the cost of three of his own. Interestingly, neither Gott nor his brigade commanders seem to have played a role in contesting the DAK's passage through their zone of operations – all the orders were given at the squadron and troop level.

Unaware of British attacks on the columns behind him, Rommel reached Bir Sheferzen near the Egyptian border wire around 1600 hours. By the time Kampfgruppe Stephan reached the border, it only had 21 tanks still operational (including 15 Pz III and one Pz IV), after seven had fallen out due to mechanical problems or enemy action. The column had moved nearly 100 kilometres in six hours, which was a great strain on battle-weary tanks and crews. The Panzers

The Valentine tank had its baptism of fire at Point 175 on 23 November 1941. The 8 RTR lost 12 of 16 engaged Valentines in a short, sharp action. Other Valentines, like this one, were disabled but later recovered. (IWM, E7002)

were also nearly out of fuel, with no more nearby. Making a poor situation worse, the RAF conducted a number of low-level strafing attacks on German columns throughout the day. Crüwell and the 15. Panzer-Division were struggling to catch up with Rommel, but Pz.Regt. 8 lost seven of its tanks en route and halted short of Bir Sheferzen. Even worse, the Aufklärungs-Abteilung 33 had lost all its armoured cars, greatly reducing the 15. Panzer-Division's reconnaissance capabilities.[107] When Panzer officers requested to send recovery crews to salvage the armoured vehicles left en route, Rommel rejected this idea and instead ordered the Panzer-Werkstatt vehicles to be used as a diversionary force. He also rejected the recommendation that the Panzer crews be afforded time for rest and maintenance on their vehicles. Instead, he ordered the 21. Panzer-Division to begin crossing into Egypt as soon as possible, in a manoeuvre that was very similar to the fruitless gambit attempted in September with *Unternehmen Sommernachtstraum.*

Gambara's CAM did not accomplish much on 24 November because it had been given only minimal guidance and Rommel seemed to have forgotten about them. Balotta's 'Ariete' Division advanced slowly to the south-west along the Trigh el Abd but stopped when it bumped into the 1st South African Brigade near Taieb el Esem. The motorized infantry division 'Trieste' did not move at all, but remained near Tobruk.

On the British side, Auchinleck and Cunningham did not know what to make of Rommel's 'dash to the wire', but it did not bring about the psychological collapse that Rommel had hoped to achieve. Instead, Auchinleck ordered

Heavy rains in Libya in November 1941 led to water-logged wadis and soft, muddy areas that caused problems for mechanized operations. Commanders did not always appreciate that weather was a factor, even in desert warfare. (Author's Collection)

Cunningham to continue the offensive and throw in 'the last tank' if required to win. Although Auchinleck provided no specific guidance on how to fight the battle, it was clear that the main effort of the offensive had shifted from the armour-heavy XXX Corps to the infantry-heavy XIII Corps. Major General Bernard Freyberg's 2nd New Zealand Division was now the main effort, pushing west toward Sidi Rezegh.

Once the sun set on 24 November, Rommel's behavior as a commander became increasingly erratic and bizarre. Frustrated by the 'lethargic' movement of the DAK units and their supply problems, Rommel took his chief of staff Generalmajor Alfred Gause, an aide and a few enlisted men and drove into Egypt in a single command car on a 'personal reconnaissance' – even though it was pitch dark. Soon, his vehicle broke down and Rommel was stuck. By pure luck, Crüwell and his chief of staff, Oberstleutnant Fritz Bayerlein, appeared in their captured British armoured command vehicle. However, in the darkness the party could not find a hole in the wire. Rommel impetuously took the wheel and repeatedly tried to drive the vehicle through the barbed wire obstacle barrier, to no avail. After that failure, the group of 15 Germans spent the rest of the night under the stars, unnoticed by British vehicles moving nearby. It was not until after sunup that the group was able to locate a breach in the wire and return to von Ravenstein's headquarters around 0700 hours.[108] Rommel had been out of radio communications for over 12 hours, and by travelling without escort behind enemy lines, he risked repeating O'Connor's mistake.

If Gause and Bayerlein had been allowed access to radios during the night, instead of being carted about the desert on a wild goose chase, they might have been coordinating resupply for the DAK's fuel-starved Panzer units. As it was, von Ravenstein's 21. Panzer-Division was still waiting for fuel when Rommel returned at sunrise on 25 November. Once a small amount of fuel arrived, Crüwell ordered Kampfgruppe Stephan to cross the wire into Egypt. Stephan made the first attempt around 0800 hours, by heading straight for the breach near Bir Sheferzen. However, XIII Corps had moved some of its meagre armour assets to cover this area, a composite group of 12 Matildas from 42 RTR and 44 RTR led by Major Ronald M. Rawlins. Stephan had no more than 16 operational medium tanks and he could not fight his way past Rawlins' squadron, although Rawlins was killed in the brief action.[109] Stephan then tried to bypass the British tanks by crossing the wire further south, but soon after crossing into Egypt, the German tanks were strafed by low-flying British fighter-bombers. Oberstleutnant Stephan was mortally wounded in the strafing attack and he was replaced by Major Werner Mildebrath.[110] Making matters worse, the fuel situation had led to von Ravenstein's 21. Panzer-Division crossing into Egypt piecemeal, in a very disorganized fashion. Nevertheless, Rommel ordered the division to attack toward Sidi Omar to support the isolated Italian 'Savona' Division positions and to eliminate the presumably vulnerable 4th Indian Division.

Von Ravenstein's 21. Panzer-Division mounted a very disorganized attack against the 7th Indian Brigade's positions near Sidi Omar. A German 10.5cm artillery battalion shelled the Indian positions around 0900 hours, but no ground attack was begun until 1100 hours. Major Mildebrath attacked Omar Nuovo with about 15 tanks, but without artillery or infantry support. The 1st Field Regiment, deployed behind the still-intact mine barrier, coolly waited until the German tanks were within 800 metres, then opened rapid fire over open sights. Ten German tanks were hit, including two that had their turrets

All German armour converged upon Sidi Rezegh on 21 November 1941 to crush part of the British 7th Armoured Division. (Author's Collection)

Norrie, commander of the XXX Corps during Operation *Crusader*, at his forward command post. Norrie allowed his strong armoured force to be scattered early in the offensive, which resulted in it being defeated in detail. He appears to be issuing orders directly over the radio while referencing a small map board – a method poorly suited to corps-level operations. (Author's Collection)

blown off.[111] Nevertheless, six British 25-pdr guns were also knocked out by return fire. Mildebrath limped away with his remaining seven medium tanks, four of which were damaged. Although von Ravenstein was able to mount a combined infantry-artillery assault that overran Libyan Omar late in the afternoon, this did not compensate for the damage inflicted upon Pz.Regt. 5.

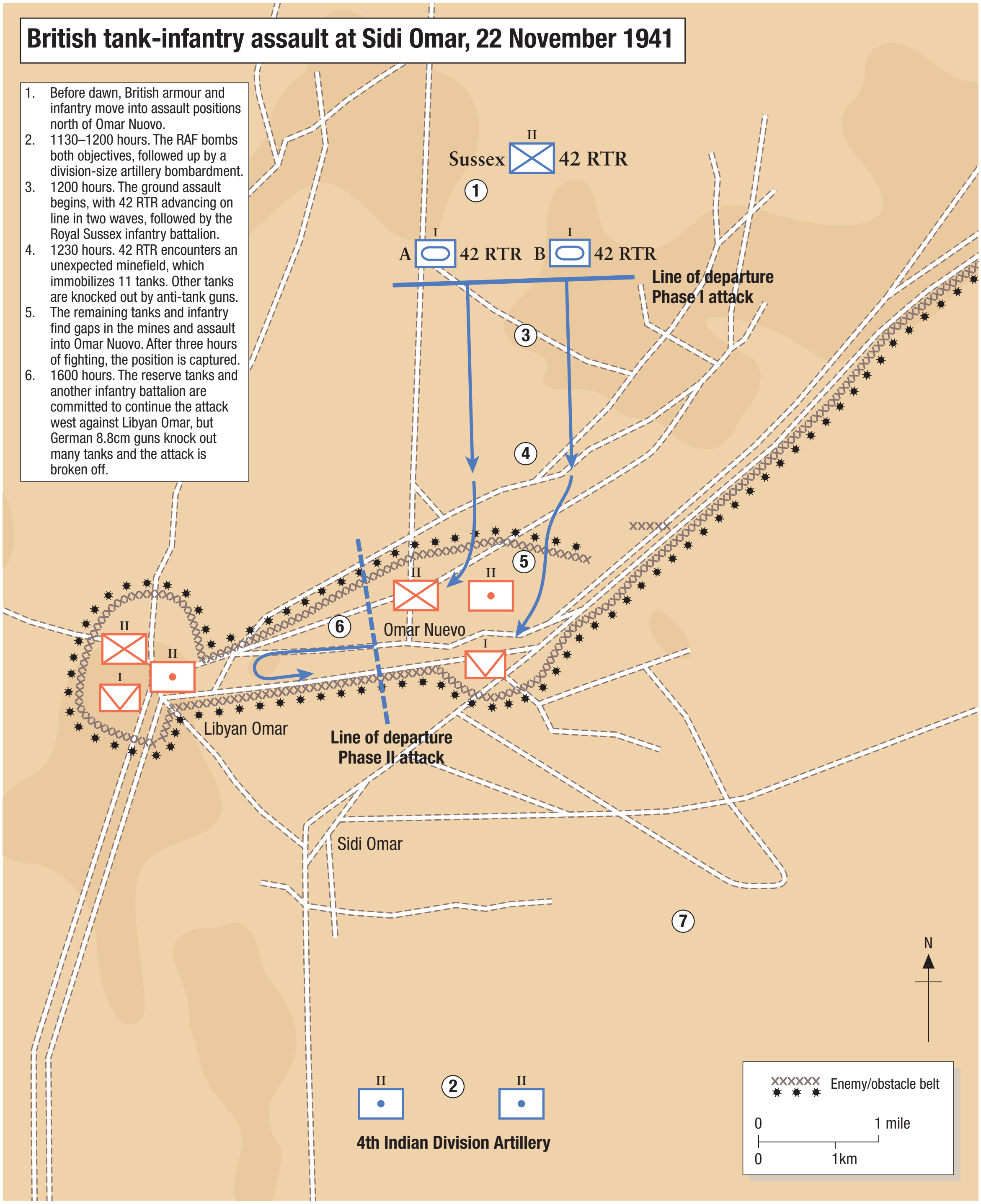
While von Ravenstein was tangling with the 7th Indian Brigade, Neumann-Silkow's 15. Panzer-Division was ordered to advance to Sidi Azeiz. En route, Cramer's Pz.Regt. 8, now with 40 medium tanks (34 Pz III, six Pz IV) stumbled onto a RAOC Light Repair Section, 10 kilometres west of Sidi Omar. The workshop personnel were in the process of repairing 16 battle-damaged Matilda tanks from the 42 RTR and not expecting enemy contact. Only a handful of the Matildas were mobile, most being in varying states of dis-assembly. Cramer immediately deployed his I. Panzer-Abteilung (I.Pz.Abt.) on line, while sending the II. Panzer-Abteilung (II. Pz.Abt.) swinging around to the right. A battery of 8.8cm Flak guns was also deployed to support the attack. Caught by surprise, the available 42 RTR tank crews hastily mounted their tanks and tried to fight a one-sided action, while the ordnance personnel scrambled away in soft-skin vehicles. Amazingly, the action lasted for 90 minutes and the British tankers were able to knock out two Pz III tanks, but in the end, all 16 Matildas were destroyed. Cramer's Panzers also took over 40 British tankers prisoners, which pretty much put paid to the 42 RTR. However, this action consumed time, ammunition and fuel which the DAK could hardly afford.

By the end of the eighth day of Operation *Crusader*, the armoured forces on both sides had been reduced to a very low ebb. The DAK's two Panzer divisions were down to about 45 operational medium tanks – just one-quarter of their starting strength. Both divisions had also lost a great deal of motor transport, infantry and support weapons. In particular, the 21. Panzer-Division was essentially crippled and needed an immediate period of rest to restore its combat capabilities. In contrast, the 'Ariete' Division still had about 80–90 M13/40 tanks and most of its motor transport. Left unmolested after Rommel's 'dash to the wire', Norrie's XXX Corps was able to begin restoring some of its damaged vehicles and by the end of 25 November it had close to 100 operational tanks. However, the personnel from the decimated 7th Armoured Division were sent back to Egypt, leaving Gott's 7th Armoured Division in a much depleted state. The XIII Corps was reinforced by C Squadron, 42 RTR (16 Matildas) and still had two squadrons of Valentines in 8 RTR, adding up to about 50 infantry tanks. Yet neither side had any real armoured mass left because the remaining tanks and support units were scattered across a broad expanse of desert. The 'great clash of armour' had left the armoured formations of both sides in a dilapidated condition.

Since the beginning of Operation *Crusader*, both sides had made their share of faulty tactical and operational-level decisions, which proved very costly on the battlefield. Crüwell succeeded in defeating the 7th Armoured Division and the 5th South African Brigade at Sidi Rezegh, but Rommel's futile 'dash to the wire' gave the Commonwealth forces the opportunity to recover from these mistakes. While historians can argue that the 'dash to the wire' had the potential to spook 8th Army into a retreat – as Rommel intended – that mission did not require the entire Axis mechanized force. The Italian CAM had already demonstrated at Bir el Gubi that it could conduct a competent mobile defence and it should have been retained near Tobruk to contain the breakout operation and hold off the New Zealand infantry. By forcing the 'Ariete' Division to join the 'dash to the wire', Rommel squandered his last intact armoured reserve for no purpose. Furthermore, Rommel violated the basic German armoured doctrine of creating a *Schwerpunkt* at a critical point on the battlefield, instead dispersing his armour to attack targets of opportunity in the Allied rear areas.

While Rommel thrashed about near the Egyptian frontier, Freyberg's 2nd New Zealand Division was doggedly advancing toward Belhamed and Sidi Rezegh, while leaving its 5th Brigade to protect its lines of communications. Had Rommel ordered the Italian CAM to rush to Sidi Rezegh on 24 November, there is little doubt that its two divisions could have halted the New Zealander's advance until the DAK returned. Instead, Rommel kept pressing the 'Ariete' Division to head to the wire – thereby reinforcing failure. Late on 25 November, the Tobruk garrison launched another round of attacks against the Axis defensive positions near Ed Duda (held by elements of the Division z.b.V. and the Italian Bologna division). Two squadrons of Matilda tanks led the attack, but they were frustrated by mines and heavy defensive fire. However, the 4th New Zealand Brigade captured the Belhamed Ridge at 0100 hours on 26 November, while the 6th New Zealand Brigade reached Sidi Rezegh

A pair of Crusader Mk I tanks, November 1941. Most of the new Crusader I tanks were concentrated in the inexperienced 22nd Armoured Brigade. (IWM, E 6724)



British tank-infantry assault at Sidi Omar, 22 November 1941

1. Before dawn, British armour and infantry move into assault positions north of Omar Nuovo.
2. 1130–1200 hours. The RAF bombs both objectives, followed up by a division-size artillery bombardment.
3. 1200 hours. The ground assault begins, with 42 RTR advancing on line in two waves, followed by the Royal Sussex infantry battalion.
4. 1230 hours. 42 RTR encounters an unexpected minefield, which immobilizes 11 tanks. Other tanks are knocked out by anti-tank guns.
5. The remaining tanks and infantry find gaps in the mines and assault into Omar Nuovo. After three hours of fighting, the position is captured.
6. 1600 hours. The reserve tanks and another infantry battalion are committed to continue the attack west against Libyan Omar, but German 8.8cm guns knock out many tanks and the attack is broken off.

II
Sussex
42 RTR
①
I
A
42 RTR
I
B
42 RTR
Line of departure
Phase I attack
③
④
⑤
II
II
Omar Nuovo
I
⑥
II
II
I
Libyan Omar
Line of departure
Phase II attack
Sidi Omar
⑦
N
II
②
II
4th Indian Division Artillery
XXXXXX Enemy/obstacle belt
0
1 mile
0
1km

Rommel in his command track, *Grief*. Rommel was frequently out of communications with the main Afrika Korps command post, which led to a crisis in the battle. However, his front-line troops appreciated having a commander they could see, which could benefit morale. (Author's Collection)

airfield.[112] At 1210 hours, Brigadier Willison, commander of the 32nd Army Tank Brigade, mounted an attack with about 30 Matildas from 4 RTR and 7 RTR supported by artillery and infantry, and succeeded in capturing the key Ed Duda position from Italian infantry.[113] The stage was set for the New Zealanders to link up with the Tobruk garrison, now separated by less than 3 kilometres. The critical moment of the campaign had arrived.

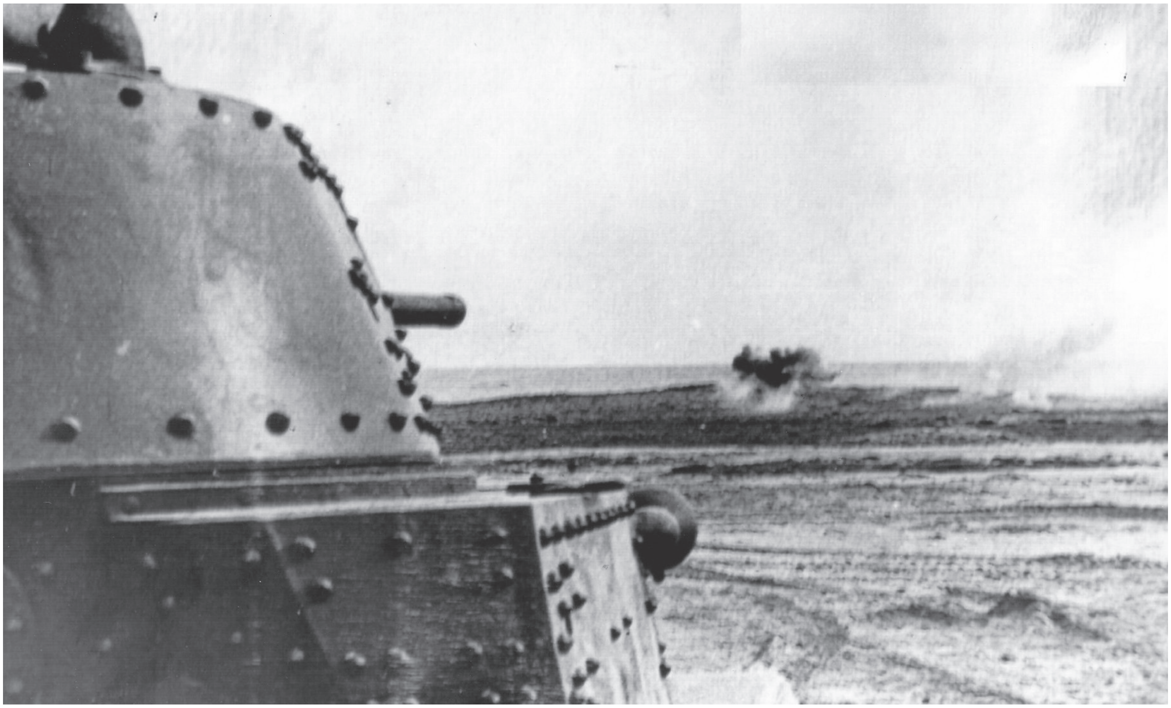
Rommel was nowhere to be found and he was not in communications with Panzergruppe headquarters. Near El Adam, Westphal tried desperately to get in touch with Rommel, but when that failed, he personally ordered the 21. Panzer-Division to return to the Tobruk area, although the lack of fuel made this problematic.[114] In the interim, Panzergruppe directed the Italian 'Trieste' Division to move to Sidi Rezegh to block the 6th New Zealand Brigade. The 9° Reggimento Bersaglieri arrived on the morning of 26 November, along with three German tanks, which were likely repaired vehicles. The Italian *bersaglieri* and German tanks overran some New Zealand infantry from the 6th Brigade around 1030 hours, but B Squadron, 8 RTR intervened. For Lieutenant Stuart Hamilton, a troop commander in B Squadron, the tank-versus-tank action at 1100 hours was his baptism of fire:

> As we were coming to the top of the crest at about four or five mph, there was suddenly the most tremendous crash on the left side of the turret, a sheet of flame flickered round my legs and I was temporarily concussed by the blast and blinded by something which splashed all over my eyes and face. When I shook my head clear and wiped my face with my

> hands, which came away all bloody and messy, I looked down into the smoking interior of the turret and saw that the wireless immediately alongside me was well and truly on fire. There were two smoke-blackened holes on the left side of the turret and my gunner was slumped over the gun minus most of the left side of his face and the top of his head, and I was splattered with his blood and brains.[115]

Soon thereafter, the three German tanks were knocked out and the Italian *bersaglieri* counter-attack fell short of retaking the airfield. Freyberg decided to mount a night assault with one infantry battalion and one squadron of 17 Matildas from 44 RTR towards Ed Duda, which was a rather atypical operation for 8th Army (although 44 RTR had done some night training). At 2130 hours, Major Eric H. Gibbon led ten Matildas forward, without infantry or artillery support. A second group of seven Matildas followed soon thereafter, with a New Zealand infantry battalion (partly on foot, partly in carriers). The German artillerymen in the area were caught by surprise and a two batteries with a total of eight howitzers were captured. Amazingly, Gibbons' tanks reached Ed Duda by 2145 hours and succeeded in linking up with the Tobruk garrison without further loss.[116] Although the corridor was narrow and tenuous, the 8th Army had accomplished one of its primary campaign objectives.

Despite the impending link-up with the Tobruk garrison, Auchinleck had already decided that Cunningham needed to be replaced because he lacked the



An M13/40 tank firing at a target. At Bir el Gubi on 19 November, two battalions of Italian tanks closed to within about 400 metres of the British Crusader tanks. (Filippo Cappellano)

A Crusader I from the 22nd Armoured Brigade knocked out in the early days of the British offensive. An Italian soldier is checking out the vehicle. (Author's Collection)

aggressive determination to fight through to victory. On the afternoon of 26 November, Cunningham was officially relieved of command and replaced by Major General Neil Ritchie, one of Auchinleck's most senior staff officers. Ritchie was an experienced general staff officer, but his command experience was limited to commanding a peacetime infantry battalion in Palestine. Nor did Ritchie have any direct experience directing a modern combined arms operation. Given Ritchie's very limited experience, Auchinleck decided to remain forward to oversee operations. Meanwhile, Rommel did not receive any intimation about the crisis developing around Sidi Rezegh until about 1030 hours on 26 November and, even then, he did not attach much importance to Westphal's reports (which described the situation as 'great danger'). Instead, he wanted to keep attacking targets of opportunity in the British rear area, even though it was already apparent that 8th Army was not going to cut and run. It was not until the afternoon, when he learned that von Ravenstein's 21. Panzer-Division had left Egypt and moved to Bardia, that he finally accepted the need to return westward. Although he released Kampfgruppe Cramer to head west along the Trigh Capuzzo back to Sidi Rezegh, he ordered part of the 15. Panzer-Division to continue mop-up operations around Sollum-Bardia for a little bit longer.[117] Rommel's lingering attachment to his 'dash to the wire' scheme was emotional, not rational.

By the end of 26 November, both sides were coming to accept that the campaign had not unfolded as intended. The original *Crusader* plan had been premised upon armoured mass and manoeuvre, along the lines envisioned by Liddell Hart and the EMF manoeuvres at Tidworth, but the enveloping manoeuvre actually led to dispersion, not decision. Instead of the great clash of armour, the 7th Armoured Division gradually unravelled under the weight of small tactical mistakes that prevented it from operating as a cohesive combined arms team. Likewise, Rommel's intent to use the DAK to encircle and smash the British armour had fallen short of the perfection seen in France in 1940, partly due to the friction of war but also due to Rommel's constant bickering with his key subordinates. While the DAK had inflicted a sharp tactical reverse on the 7th Armoured Division, it had not finished off its wounded opponent and even allowed it a vital respite to recover. After nine days of fighting, the campaign could still swing to either side, although the weight of logistics and reinforcements favoured the 8th Army.

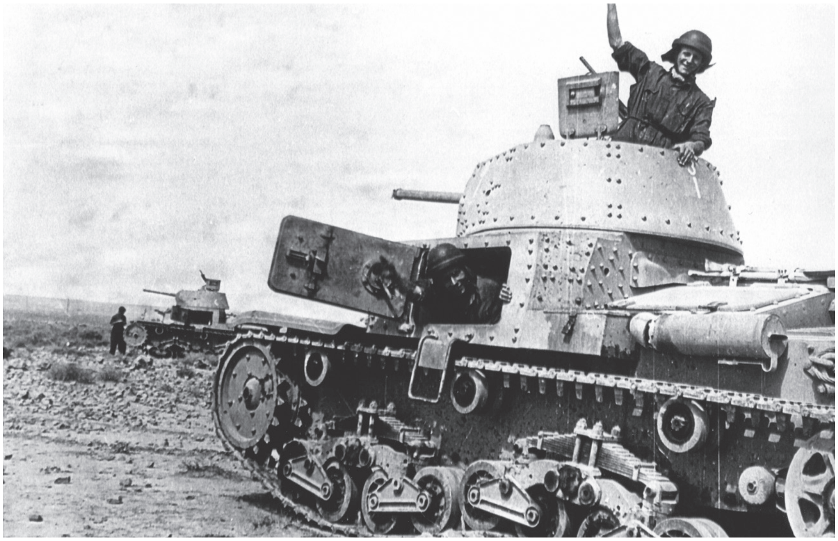
OPERATION *CRUSADER*, CONCLUSIONS, DECEMBER 1941

'Two years of training, a sea journey half-way around the world and in just half an hour it's all over for us!'[118]

Captured British armour officer

The re-consolidation and reconstitution of the 7th Armoured Division was a tortured process that went on for days after the defeat at Sidi Rezegh and would not have been possible if Rommel had prevented its scattered components from rallying. Nevertheless, by 27 November Gott had begun to partly restore his division. About 70 damaged tanks had been recovered from the battlefield and a batch of 40 brand-new Stuart tanks had arrived from Cairo.[119] As a result, the 4th Armoured Brigade (3 RTR, 5 RTR, 8 H) was able to field 77 tanks and the 22nd Armoured Brigade (2 RTR, 3 CLY, 4 CLY, 2 RGH) had 42 tanks. Campbell's Support Group had lost one of its motorized infantry battalions and about one-third of its artillery, but it still had the equivalent of one infantry and two artillery battalions. Gott now had a significantly smaller division, but it had regained limited combat effectiveness and additional replacements would arrive soon.

On the morning of 27 November, Kampfgruppe Cramer was receiving conflicting orders from Westphal to return at once to Sidi Rezegh, while Rommel had decided to attack the New Zealand 5th Brigade at Sidi Azeiz. Cramer complied with Rommel's order, deploying his 40 remaining tanks south-east of Sidi Azeiz before dawn. Although short of fuel and ammunition, Cramer's regiment had managed to scrounge some fuel from captured British stocks, just enough to keep moving. At Sidi Azeiz, Brigadier James Hargest had a reinforced infantry battalion, with a battery of 25-pdrs, four 2-pdrs mounted porteee, three 40mm Bofors guns and three obsolescent 18-pdr guns. After an artillery barrage from II./A.R. 33, Cramer attacked just after 0700 hours. Hargest was not expecting a major enemy tank attack from the east and his unit was deployed in a circular perimeter, with most of his guns facing west. The 2-pdr portee gun trucks gamely moved out of the perimeter to engage Cramer's approaching tanks and opened fire at



ABOVE Italian tankers from the 'Ariete' Division are jubilant after their tactical victory at Bir el Gubi. On this occasion, Italian mechanized doctrine and equipment proved adequate to the mission. (Author's Collection)

BELOW British Matilda tanks from the 32nd Army Tank Brigade (7 RTR) line up for the breakout operation from Tobruk on 21 November 1941. Two-thirds of the Matildas would be disabled on the first day of the attack by enemy Flak and anti-tank guns, but a serious dent was made in the Axis perimeter. (Author's Collection)

1,200 metres. However, the German tanks quickly scored direct hits on three of the portees. One by one, the British guns were knocked out, although the 40mm Bofors guns inflicted some damage firing a mix of AP and HE rounds at ranges of just 300 metres. Once the German tanks reached the perimeter, the New Zealand infantry were unable to mount effective resistance, despite a vain attempt to use improvised 'sticky bombs'. To prevent his men from being slaughtered, Hargest personally surrendered to Cramer. Altogether, 696 New Zealanders were captured and 44 killed.[120] German losses in this action were minimal.

On 4 December, the Afrika Korps evacuated its main Panzer repair depot at El Adem. Many vehicles, including 20 tanks, were abandoned. (Author's Collection)

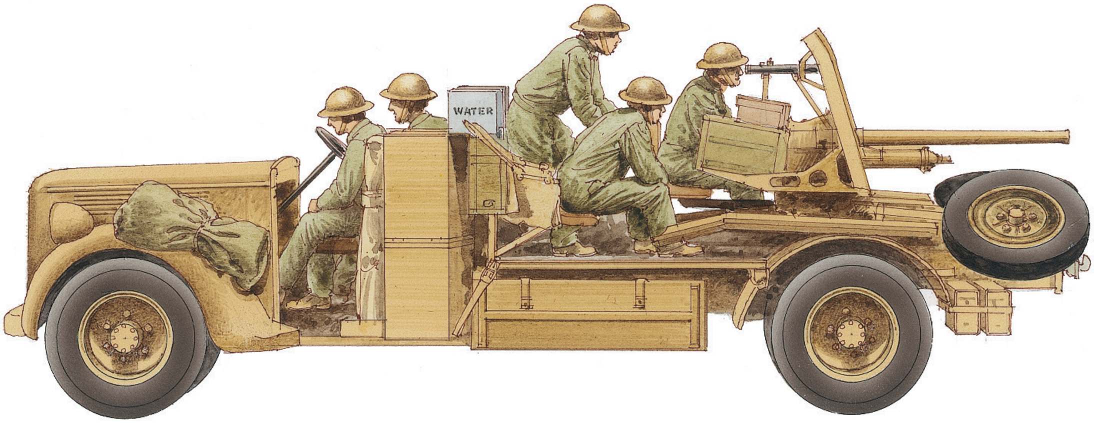
With the New Zealand 5th Brigade decimated, Rommel allowed Cramer to disengage and head west along the Trigh Capuzzo, although he retained the infantry of Kampfgruppe Menny to continue mop-up operations around Bardia for the rest of the day. While moving along the Trigh Capuzzo, Kampfgruppe Cramer was strafed several times by low-flying Tomahawks, which inflicted four killed and eight wounded. At this point in the Second World War, German armour did not yet have a great deal of light Flak guns to protect its columns during daylight movement, but the campaign in North Africa would drive that lesson home.

Armoured cars from the KDG spotted Kampfgruppe Cramer moving west on the Trigh Capuzzo and reported it to XXX Corps around 1130 hours. Gott ordered the 22nd Armoured Brigade, now under Lieutenant Colonel Carr, to occupy a blocking position near Gasr el Arid, about 22 kilometres east of Sidi Rezegh. Gott also ordered Gatehouse to move his 4th Armoured Brigade in from the south, against the left flank of the German column. On paper, the British would enjoy a 3-1 numerical superiority in tanks in the coming action, although their artillery support was limited. With a little imagination, Gott might have ordered his engineers to lay a mine obstacle on the Trigh Capuzzo to hinder the German advance, but that was not considered.

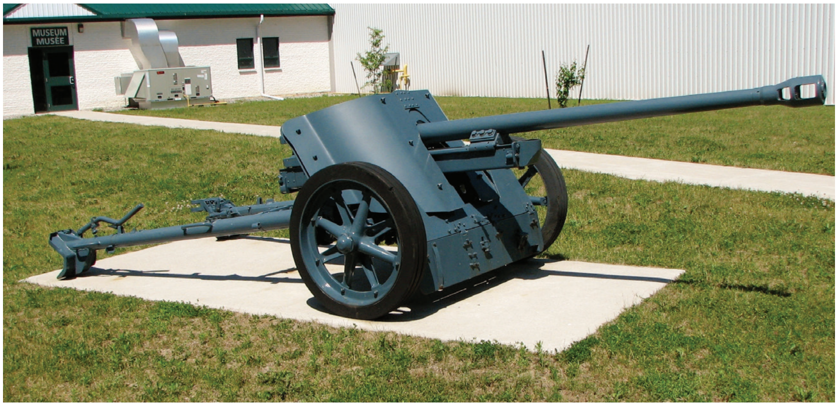
By 1300 hours, Carr had his tanks deployed on high ground, looking west, when the head of the German column was spotted. Carr had bits and pieces of four different armoured regiments under his command, with the largest fragment being Major George F. Yule's composite squadron of 14 tanks from the 2 RTR. Major Trevor's 2 RGH had only eight tanks, while 3 CLY and 4 CLY had ten each. Yule's tanks were the first to engage the German column, at a range of about 800 metres, and claimed four enemy tanks destroyed. However, Kampfgruppe Cramer quickly deployed its tanks and artillery and proceeded to pound the British blocking position with long-range fire, knocking out two of Yule's tanks. Likewise, both the 2 RGH and 3 CLY claimed a few kills, but admitted the loss of three of their own tanks.[121] Carr was also wounded in the action, so brigade command passed to Lieutenant Colonel Richard K. Jago. The action lasted throughout the afternoon and two batteries of 25-pdrs were brought up to shell the stalled German column. While the head of the column was fully engaged, the 4th Armoured Brigade approach the flank and rear of the column and were offered a perfect opportunity to inflict massive damage on Cramer's support units. Lieutenant Crisp, now in charge of the ten Stuarts of C Squadron, 3 RTR noted that there was a 'dense throng of transport in front of me. The Trigh was black and broad and moving with packed trucks and lorries… There was not a panzer in sight.'[122]

Lieutenant Colonel A. A. H. Ewin, commander of 3 RTR, ordered his two squadrons to attack. Initially, the Germans were caught by surprise and Crisp's Stuarts charged at the column and inflicted great damage upon the enemy motorized transport. However, the Germans quickly regained their composure and began deploying 10.5cm howitzers from the 6. Batterie of II./A.R. 33 and the anti-tank guns from Pz.jg.-Abt. 33. Apparently, the rest of 3 RTR and 5 RTR did not close with the enemy column, which left Crisp's ten Stuarts dangerously exposed (Crisp may have attacked prematurely – his memoir often omitted inconvenient details). The German gunners began methodically picking off the Stuarts. Crisp's tank was struck in the back of the turret and when he traversed his turret, he saw 'not fifty yards away a 5-cm anti-tank gun pointed straight at the Honey [Stuart]'. He ordered his gunner to fire the coax machine-gun, but at that moment:

> I saw the puff of smoke from the anti-tank gun and felt and heard the strike on the armour-plating. Quickly I looked down into the turret. A foot or two below me, the gunner was staring at his hand, over which a dark red stain was slowly spreading. Then he gave a scream and fell groveling on the floo . In the top right hand corner of the turret a jagged hole gaped….[123]



The British tactical experience with the 2-pounder anti-tank gun mounted portee in 1941 demonstrated that mobility was purchased at the price of low survivability in combat. The U.S. Army would commit the same mistake with its jury-rigged tank destroyers in Tunisia in 1942–43. (© Osprey Publishing Ltd, by Brian Delf. From NVG 98 *British Anti-tank Artillery 1939–45*)



The German 5cm Pak 38 anti-tank gun was the premier threat to British tanks, since its low profile made it difficult to spot and it could fire Tungsten core AP rounds. (Author's Collection)

However, the Stuart was not yet disabled and Crisp fired his coaxial gun – apparently causing the German Panzerjägers to take cover – and his driver was able to manoeuvre the damaged tank to cover. Crisp's tank was eventually able to escape, but when he looked back he saw that 'four of my tanks were blazing infernos; three others just sat there, sad and abandoned'. Altogether, the British lost 19 tanks in the action, which lasted until dusk. However, once darkness fell, the 22nd Armoured Brigade withdrew 8 kilometres to the west and went into laager, without leaving any kind of covering force on the Trigh Capuzzo; this was a case where ingrained habits led to a serious tactical error. Once the track was free of British tanks, Kampfgruppe Cramer continued to push forward in the darkness and nearly reached Point 175. Yet the DAK was still strung out all the way back to Sidi Azeiz, which precluded a major German armoured attack on the next morning.

It ended up taking most of 28 November to assemble the 15. and 21. Panzer-Divisionen east of Point 175, and von Ravenstein's division had limited combat effectiveness remaining due to losses. The 15. Panzer-Division skirmished some more with the 4th Armoured Brigade, knocking out four Stuarts from 3 RTR at the cost of three German tanks.[124] The 'Ariete' Division, which had finally reached the area near the Egyptian frontier, was also brought back west but bumped into some of Campbell's Jock Columns south of the Trigh Capuzzo. For their part, the 8th Army tried to improve its positions around Sidi Rezegh, but Freyberg was trying to hold too many positions with only six infantry battalions and a couple of squadrons of infantry tanks. Norrie focused on bringing up the 1st South African Division to support Freyberg, but the South Africans proved very reluctant to take any more risks after the loss of their 5th Brigade and demanded armoured escort to move to Sidi Rezegh. As a result, the South Africans failed to reach Sidi Rezegh and much of the 4th Armoured Brigade was diverted away from Sidi Rezegh.[125] Although the rest of Gott's 7th Armoured Division remained off to the south-east, theoretically within support range of Freyberg, only a few depleted tank squadrons were capable of intervening at short notice. Elements of the British 70th Infantry Division and the 32nd Army Tank Brigade were at Ed Duda, west of Freyberg, but had limited reserves. In essence, the British forces around the corridor to Tobruk were rather spread out and vulnerable to piece-meal destruction. Crüwell's plan of action intended to exploit these vulnerabilities in order to inflict a crushing defeat on the relief force.

The morning of November 29 began badly for the DAK, when Generalmajor von Ravenstein, driving in a staff car with two other Germans, was captured by soldiers from the New Zealand 21st Battalion near Point 175. Von Ravenstein was carrying his map case and operational documents, which proved a windfall for Allied intelligence.[126] As a result of this poor start, the 21. Panzer-Division did not accomplish much beyond a minor fixing attack against the 4th New Zealand Brigade. However, the 15. Panzer-Division and the 'Ariete' Division mounted serious attacks, which caught 8th Army by surprise. Kampfgruppe Cramer began advancing west at 0700 hours with 39 tanks (incl. 25 Pz III and 3 Pz IV), bypassing the New Zealand battalion on Point 175 and linking up with mixed infantry/artillery formation Gruppe Böttcher south of Sidi Rezegh four hours later. Cramer had moved across the front of Gott's 7th Armoured Division without provoking any real response, so Crüwell ordered Cramer to swing his *Kampfgruppe* around and attack Ed Duda from the south-west. Not expecting an attack, only two depleted infantry companies from the 1st Essex and a few Matildas from the 44 RTR had been left on Ed Duda. Cramer began his attack around 1400 hours, with infantry and artillery support. Brigadier Willison committed his reserve, nine Cruisers from 1 RTR, which with the help of artillery support from the 1 RHA managed to rebuff Cramer's assault. The British position was also protected by barbed wire obstacles and mines. Cramer mounted another attack at 1640 with the support of an infantry battalion from S.R. 115 and Böttcher's heavy artillery. The defenders on Ed Duda were heavily pounded and gradually overrun by Hauptmann Wolfgang Wahl's II./Pz. Rgt. 8 despite fierce resistance. Five Matildas, several of which were immobile, were eliminated. By 1715 hours, the German infantry had secured a good portion of Ed Duda, but they failed to actually clear the entire positon. In fact, the British battalion headquarters was still on the high ground, only 200 metres from the German infantry.[127] Cramer had lost four tanks in the attack (including one Pz III and two Pz IV) – all due to mines – and he had expended 20 per cent of his ammunition. For reasons not entirely clear, Cramer decided to pull his unit back to re-supply, leaving only about 150 infantrymen and two 3.7-cm anti-tank guns from S.R. 115 on Ed Duda.

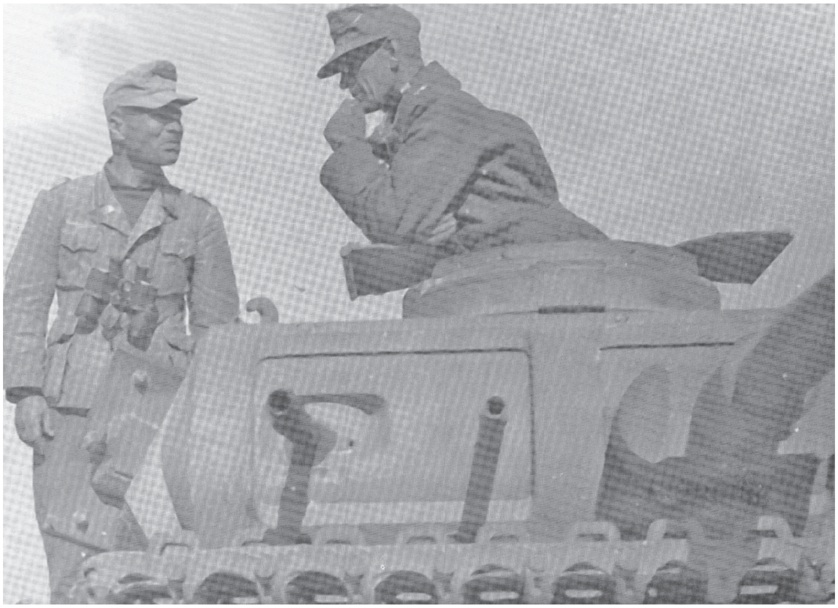
The 21. Panzer-Division, which had fewer than 20 operational tanks in Pz.Regt. 5, mounted a hasty attack against the New Zealand 4th Brigade positions south of Zaafran, but was stopped by the rapid intervention of the 8 RTR's last tanks. Major John A. O'Neill was killed leading his A Squadron against Pz.Regt. 5. The 8 RTR was left with only a single operational Valentine tank.[128]

Meanwhile, the 'Ariete' Division had swung north against Point 175, still held by the New Zealand 21st Battalion. Three tanks and a few anti-tank guns had been provided to the New Zealand battalion for defence, but these were gradually put out of action by enemy artillery fire during the day. Around 1730 hours, a mixed Italian column, with tanks and motorized vehicles, approached Point 175, but somehow the New Zealanders mistook them for the errant 1st South African Division and did not open fire. Consequently, the Italian tanks captured two companies of New Zealand infantry and the rest of the battalion withdrew during the night.[129] For once, the fortunes of war had favoured the Italian *carristi*, who captured an important position without significant losses.

Although Commonwealth units did not usually display a great deal of tactical agility during Operation *Crusader*, one exception was the fighting around Ed Duda. Having lost this important position in the afternoon, the Tobruk garrison managed to recover it six hours later with a brilliantly conducted night attack that used two Australian infantry companies and 11 Matildas from the 4 RTR.[130] Directed by the still-intact headquarters of the 1st Essex Battalion on Ed Duda, the Australians caught the Germans totally by surprise by not using any artillery support. Both 3.7cm Pak guns were quickly destroyed by the Matildas and 167 German infantry were captured. The nearby German tactical reserve failed to act, thereby enabling the small Allied force to consolidate on the objective.

Despite the loss of Ed Duda, Rommel ordered Crüwell to crush the 2nd New Zealand Division with his two Panzer divisions and the 'Ariete' Division. Rather than mount another hasty attack, as they had the day before against Ed Duda, Crüwell and Neumann-Silkow intended to mount a properly

All German armour converged upon Sidi Rezegh on 21 November 1941 to crush part of the British 7th Armoured Division. (Author's Collection)



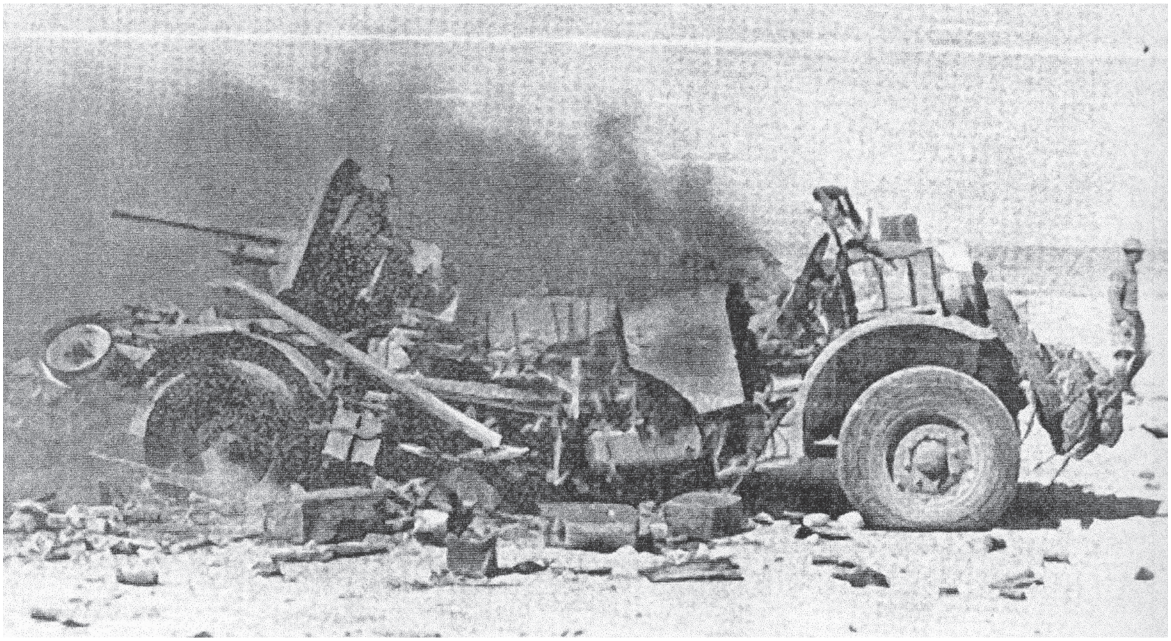
Oberstleutnant Friedrich Stephan, commander Pz.Regt. 5 (left), confers with Generalmajor Neumann-Silkow during the fighting around Sidi Rezegh. Both officers would be killed in action during Operation *Crusader*. (Author's Collection)

co-ordinated combined arms attack against the New Zealand 6th Brigade at Sidi Rezegh. The heavy artillery from Gruppe Böttcher (now re-designated Gruppe Mickl under Oberst Johann Mickl began a lengthy artillery bombardment against the New Zealand brigade at 1030 hours, which gradually pulverized many of its support weapons. At 1430 hours, the Germans began moving up their armour and motorized infantry, but did not yet attack. The New Zealand 6th Brigade had two infantry battalions (24, 26 at Sidi Rezegh and one east of the airfield (25; the brigade had only limited artillery support and could not seriously interfere with the German forces being assembled in plain sight to the south. Satisfied that the artillery had degraded the New Zealand defences, Cramer began advancing with his tanks at 1630 hours, sending one battalion swinging around to the north and the other to the south, in order to conduct a pincer attack. Instead of digging in their remaining 2-pdr anti-tank guns, the New Zealanders send them forward mounted on portee – and they were all quickly destroyed. Once their anti-tank guns were eliminated, Cramer's Panzers came on fast and overran both the 24th and 26th battalions.[131] Some troops escaped, but the Germans took over 600 prisoners and the 6th Brigade was reduced to fragments.

While the DAK was crushing the New Zealand 6th Brigade, Gott's 7th Armoured Division spent the day 10 kilometres to the south-east, doing very little. Norrie was still focused on bringing up the reluctant 1st South African Brigade, which again diverted the 4th Armoured Brigade's attention away from the fighting at Sidi Rezegh. Gatehouse sent the 3 RTR (14 operational tanks to escort the South African infantry brigade (which was apparently terrified that Panzers would suddenly appear and attack it en route, leaving just Drew's 5 RTR (26 Stuarts and Major Peter D. Sandbach's composite squadron from 8 RTR to watch the Italian 'Ariete' Division on Point 175.[132] Gott also decided to send the 22nd Armoured Brigade south to Bir el Gubi to refit, which left very little of his division in contact with the enemy. However, Crüwell did not realize how little of 7th Armoured Division was nearby, and he directed the 'Ariete' Division to screen the area south of Point 175 to prevent any interference by the 4th Armoured Brigade. Balotta committed a battalion-size armoured group against the 4th Armoured Brigade on the morning of 30 November. In the ensuing action, Major Paddy Doyle's B Squadron 5 RTR and some 8 RTR tanks destroyed 13 M13/40s and five tankettes. Sandbach's squadron from 8 RTR had three Stuarts disabled, but they were recovered. This kind of lop-sided tactical action was reminiscent of the 1940 desert campaign, and it is unclear why such a small British armoured force was able to defeat a larger Italian armoured force so easily. It is clear that the Stuart enjoyed no great technical advantage over the M13/40 in terms of firepower or armoured protection. Nevertheless, the Italian tanks did achieve their mission objective of preventing the 4th Armoured Brigade from interfering with the DAK's attack at Sidi Rezegh.

Rommel continued his efforts to crush Freyberg's increasingly isolated division on 1 December, shifting his focus to the New Zealand 4th Brigade at Belhamed. The German attack began with another strong artillery barrage from AR 33 that began at 0615 hours, which gradually destroyed much of the New Zealanders' motor transport and covered the area with dust and smoke. The DAK had learned a great deal about attacking entrenched enemy positions in the past few days, and in the assault on Belhamed the 15. Panzer-Division demonstrated a new set of very effective combined arms tactics. Once the

The remains of a 2-pdr portee after losing a duel with German tanks. The Germans were quick to target these thin-skin vehicles with HE rounds and machine-gun fire. (Author's Collection)



enemy defences were suppressed by artillery, Cramer advanced with about 40 tanks, but instead of attacking head on, he moved obliquely across the enemy front from west to east at a range of about 2,000 metres. While moving laterally to an alert enemy is extremely risky, the obscured visibility aided Cramer's Panzers, providing only fleeting glimpses of German tanks to the New Zealanders. Brigadier Reginald Miles, the New Zealand artillery commander, ordered the 16 25-pdrs of the 6th Field Regiment to engage Cramer's Panzers over open sights; Miles was a keen advocate of using the 25-pdrs in the anti-tank role. However, the Germans expected this and as the 25-pdrs revealed themselves, they were engaged by multiple German tanks and quickly suppressed. Although the New Zealand gunners may have knocked out six German tanks, the 6th Field Regiment lost virtually all its guns by 0700 hours. Likewise, the German tanks dispatched the handful of remaining 2-pdr portee guns, mostly with 7.5cm HE rounds from Pz IVs. Once the New Zealand artillery and anti-tank guns were silenced, Hauptmann Johannes Kümmel's I./Pz. Rgt. 8 closed in for the kill. The German tank platoons employed overwatch tactics, with 2–3 tanks in a platoon advancing while the others fired at anything hostile. The German tanks fired smoke rounds just before reaching the New Zealand trenches, then appeared out of the smoke, which surprised the defending infantry. Some German tanks carried a few infantrymen on their back decks, who quickly deployed to begin mopping up the surprised defenders. Most of the New Zealand 20th Battalion was overrun by 0745 hours, although a few stalwarts held out a bit longer. One New Zealand soldier, armed with a 14mm Boys anti-tank rifle, was observed trying to engage a German Pz IV:

> Apparently he was annoying the tanks as twice I saw the turret swing round and send a hail of bullets in his direction. He bobbed down each time the turret swung round and up again and continued firing when the tank was concentrating on other objects. He ran out of ammunition, yelled out for more, which we threw over to him. Leckie then continued firing and we could actually see the bullets bouncing off the tank, it was so close. Suddenly, and very quickly the turret swung round, and the tank opened fire with its 75 mm, Leckie receiving a direct hit from the shell, which also destroyed the Boys Antitank rifle and blew away part of the parapet. The tank could not have been more than fifty yards away from him at the time.[133]

After destroying the 20th Battalion, the German armour paused before moving on to finish off the nearby 18th Battalion. Freyberg appealed to Norrie for armoured support and Gott directed Gatehouse to send as much of 4th Armoured Brigade as possible to support the New Zealanders. Yet by the time that the first British tanks approached Belhamed from the south around 0900 hours, the remaining elements of the New Zealand 4th Brigade were beginning to evacuate their positions. Major Peter D.

New Zealand troops inspecting an abandoned German Pz IV tank near Tobruk, 15 December 1941. Rommel's retreat cost him all but two of his Pz IV medium tanks. The Afrika Korps also abandoned a significant amount of 7.5cm ammunition for their Pz IVs – which would be recycled by the British in 1942. (IWM, E 7062)

Sandbach's composite squadron from 8 H was the first to reach the New Zealand positions, which were still under heavy fire. The British Stuarts blundered into Hauptmann Wolfgang Wahl's II. Panzer-Abteilung, provoking a short, sharp action. Sandbach was soon killed in action and three Stuarts from 8 H were disabled. After learning that the New Zealanders were evacuating their positions, the British tanks retired southward. Given the dust, smoke and enemy artillery fire, there was a great deal of confusion on Belhamed ridge, but the feeble last-minute intervention of the British armour suggests a shocking level of indifference in the 7th Armoured Division's leadership to the fate of the New Zealand Division. Consequently, Freyberg was forced to break off the battle and retire to Zaafran by dusk. During the night of 1 December, Freyberg decided to continue retreating all the way to the Egyptian frontier.[134] The 8th Army's tenuous corridor to the Tobruk garrison had once again been severed and victory appeared within Rommel's grasp.

Despite the appearance of victory, the DAK had shot its bolt – it was an exhausted force, with negligible reserves of ammunition, fuel or spare parts. New Zealanders at Belhamed had noted that the road wheels on Cramer's Panzers were nearly devoid of rubber and that the German tanks were

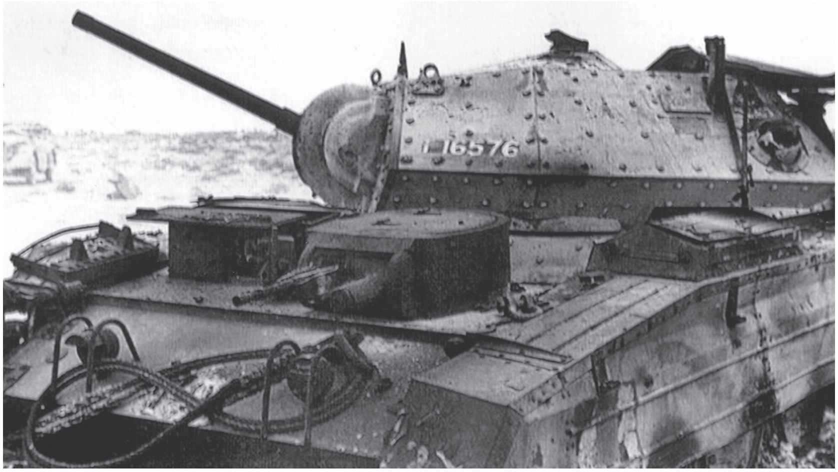
A British 25-pdr field gun in action near Tobruk. The 25-pdr could engage enemy tanks beyond the range of the 2-pdr, but it tended to kick up a great deal of dust when it fired over open sights. (Author's Collection)

extremely worn looking.[135] The tactical success at Belhamed had cost Cramer another 20 tanks, leaving Pz.Regt. 8 with just 16 operational tanks (four Pz II, ten Pz III and two Pz IV). The Pz.Regt. 5 was in similar shape, with 21 tanks. The 'Ariete' Division had about 56 M13/40 tanks still operational.[136] Rommel's armour was in desperate need of refit, and he could afford to let the Commonwealth forces make the next move. Instead, he barely gave the Panzer crews a single evening to rest before ordering Crüwell to pursue the retreating New Zealanders. Two small motorized *Kampfgruppen* were assembled, each based upon an infantry battalion with supporting arms, with one to advance toward Bardia along the coast road and the other along the Trigh Capuzzo to Sidi Azeiz. No German tanks were included in these groups, but three captured British tanks were attached to Kampfgruppe Knabe. These two *Kampfgruppen* began advancing on 2 December and were spotted by the RAF, which alerted the 8th Army. The 28th (Maori) Battalion had time to create an excellent kill zone at Menastir, west of Bardia, which Kampfgruppe Geissler blithely drove into on the morning of 3 December. The German column was literally shot to pieces, suffering 260 dead and 120 captured; the Maoris suffered only one dead and nine wounded. One German-manned Matilda tank was also recaptured. Likewise, the southern German column was ambushed by Indian troops near Sidi Azeiz, suffering 100 dead and 100 captured.[137]

Doubling down on his mistake, Rommel ordered Crüwell to send Pz. Regt. 8 to Sidi Azeiz to support the southern column, even though it had already been defeated. Cramer's Panzers set off for Sidi Azeiz on 4 December, but after reaching that location, the regiment was ordered back to Tobruk, altogether moving 190 kilometres in 16 hours, which added needless wear on already degraded tanks. The Italian 'Ariete' Division was also sent east toward Sollum, leaving only the RECAM to guard the supply depots near Bir el Gubi.[138] Simultaneously, Rommel was incensed that the British 70th Division still held Ed Duda and ordered a series of attacks against that position between 1 and 4 December, which resulted in considerable German casualties. Whereas the German infantry at Ed Duda were only supported by a few repaired Pz III tanks from 21. Panzer-Division and a handful of Panzerjäger I tank destroyers, the British infantry were supported by 27 Matildas from 4 RTR. Inevitably, Rommel's forces were unable to retake Ed Duda.

While Rommel was distracted by these misadventures, Gott sent the 11th Indian Brigade, supported by 16 tanks from the 8 RTR and two artillery regiments toward Bir el Gubi on 3 December to threaten the Axis lines of communications. Mellenthin reported to Rommel that British armoured cars were operating near El Adem.[139] The only reason that Gott was able to move forces into this vacuum was that Rommel had moved Gambara's CAM out of pocket to send it on another futile dash toward the Egyptian border. Rommel's forces were now so depleted that he no longer had the means to contest Gott's manoeuvre, or so he thought. Amazingly it was Rommel – who had sought to panic the British into flight with his 'dash to the wire' – who was now spooked by the advance of an Indian brigade and a single squadron of infantry tanks. In fact, Rommel still had the resources to block the Indian advance, particularly if he quickly re-directed the 'Ariete' Division back to Bir el Gubi. Instead, Rommel acted emotionally and chose to throw in the towel, even though Panzergruppe Afrika still had options. At 1500 hours on 4 December, Rommel ordered Crüwell to withdraw the DAK toward El Adem. The DAK was forced to abandon its main Panzer repair depot with little warning, which meant that 30 damaged tanks were blown up, including 20 precious medium tanks. A

German tanks and infantry clearing Allied hasty positions near Sidi Rezegh. Note that the Pz II commander in the background is armed with an MP40 and appears to be wary of Allied troops in the area. (Author's Collection)



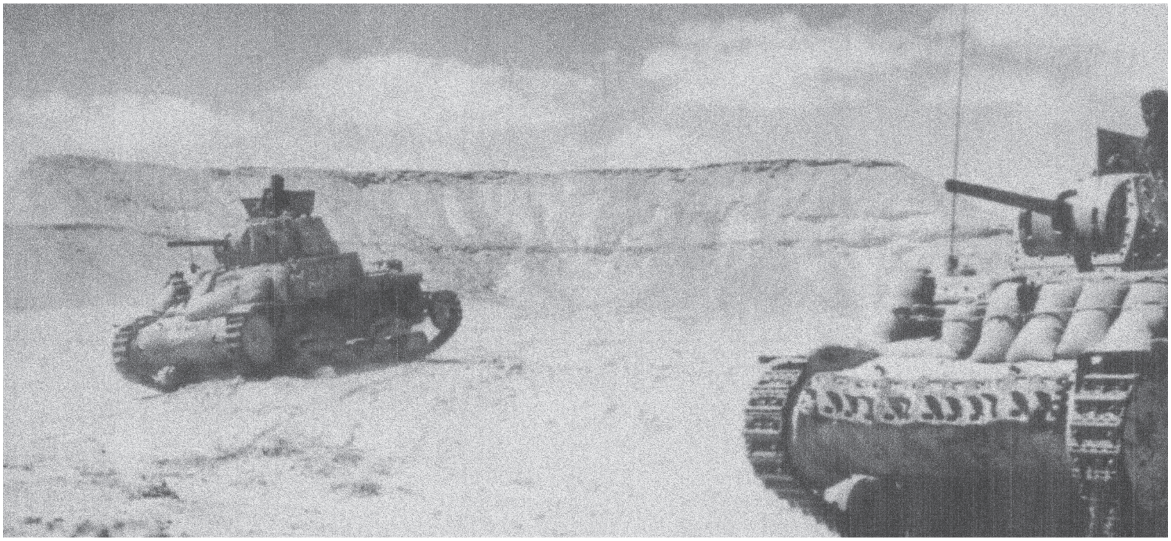
A destroyed Crusader I. It was quickly apparent that the auxiliary turret on the left front slope was a bad idea and it was removed in subsequent variants. (Author's Collection)

great deal of support weapons and motor transport, as well as the DAK's wounded, were also abandoned in the hasty retreat.

Surprisingly, an Italian infantry regiment, supported by the RECAM, put up a spirited defence at Bir el Gubi for four days. Eventually, Crüwell decided to lend some support to the Italian defence and sent a column from the 15. Panzer-Division to their aid on 6 December. However, the British artillery around Bir el Gubi shelled the approaching column, mortally wounding Generalmajor Neumann-Silkow. Both Panzer divisions had now lost their commanders in the space of eight days. By 7 December, the Axis were forced to abandon Bir el Gubi and Rommel informed Rome and Berlin that he intended to make a stand at Gazala, but this was a specious claim. After he had been informed by the Commando Supremo on 5 December that he could expect no major reinforcements until at least January, Rommel decided that he could not continue the battle under these conditions.[140]

Ritchie's 8th Army mounted a pursuit that was every bit as improvised as Rommel's retreat. Persistent communication problems made it difficult to co-ordinate the myriad of units involved, which included an assortment from the XXX Corps, XIII Corps and the Tobruk garrison. Supply was also a serious issue for Commonwealth forces, which had no forward depots past Tobruk. Ritchie assigned the XIII Corps to lead the pursuit – a mission for which it had not trained – while Norrie's XXX Corps was sent to mop up the remaining Axis frontier garrisons. Gatehouse's 4th Armoured Brigade had been reinforced with several new batches of Stuart tanks, raising its strength to 136 tanks. In addition, the XIII Corps had the Indian 4th Infantry Division (which was not fully motorized), two infantry brigades (5 NZ, 22 Guards) and some infantry tanks.

As the DAK withdrew to Gazala, there were several armoured skirmishes, but the XIII Corps was not able to mount a serious attack until 15 December. An attack by the 5th Indian Brigade and nine Valentine tanks at Alam Hamza



ABOVE The 'Ariete' Division also committed an armoured battlegroup to the counter-attack at Sidi Rezegh. Note the steep escarpment in the background. (Filippo Cappellano)

RIGHT 'Strafer' Gott was an infantry battalion commander in 1939, who had risen to command the 7th Armoured Division by September 1941. Gott's battlefield mistakes in 1941 were ignored and he continued to move rapidly up the ladder to corps and eventually command of 8th Army. He is easily the most over-rated commander of the desert campaign. (IWM, E2623)

succeeded in pushing back the depleted 'Ariete' Division, but a quick counter-attack by 16 M13/40 tanks restored the situation.[141] At the same time, the British 4th Armoured Brigade (total of 90 Stuarts in 2 RGH, 3 RTR, 5 RTR) began a wide encircling manoeuvre to the south, which threatened the DAK's lines of communications. In one skirmish during the manoeuvre, the 2 RGH, re-equipped with Stuarts, lost nine tanks in the action.[142] Although a few armoured cars reached Tmimi, the bulk of the 4th Armoured Brigade was slowed by fuel problems, which nagged the short-legged Stuarts. Inexplicably, Gott fumbled the opportunity to cut off – or at least harass – the DAK's escape route.[143] Consequently, Rommel began pulling out of the Gazala position on the night of 16/17 December, and headed back toward Mersa Brega. Ritchie's pursuit was cautious.

While the 4th Indian Division moved slowly through the Jebel Akhdar, a reinforced motorized force, dubbed 'Bencol', was assembled to advance through the desert toward Beda Fomm. Bencol was formed around the 22nd Guards Brigade, but was reinforced with Stuart tanks from 3 RTR, armoured cars from 11th Hussars (11 H) and the newly arrived 12th Royal Lancers (12 L), plus artillery and anti-tank. Indeed, Bencol was a fairly balanced force, although it was rather large, with over 2,000 trucks. Gott's 7th Armoured Division would only contribute one brigade to the pursuit, plus its Support Group.

In Rome, the Axis leadership was unhappy with Rommel's decision and would have preferred him to try and hold Benghazi. A desperate effort was made in mid-December 1941 to rush armoured reinforcements to North Africa, but interdiction efforts by the Royal Navy and RAF inflicted heavy losses. On the morning of 13 December, the submarine HMS *Upright* sank two Italian merchant ships off Taranto from convoy M.41; these vessels were carrying the entire complement of 52 M13/40 tanks belonging to the XII. Btgl. Carri. M.. The next Italian convoy operation, M.42, succeeded in delivering two companies with a total of 45 new German tanks to Tripoli and Benghazi on 19 December. However, Rommel was intent on salvaging as much of Panzergruppe Afrika as possible, and evacuated Benghazi five days later. Rommel positioned his remaining armour so he could block any attempt by the British to cut the Via Balbia, as they had done to the retreating Italians in February. By this point, the British pursuit had splintered into five separate groups and their air support was much diminished as they moved further west. Choosing his moment, on 23 December Rommel ordered the 15. Panzer-Division to counter-attack part of Bencol near Antelat; the attack succeeded in destroying six Stuarts from the 3 RTR before withdrawing.[144] Afterwards, the DAK fell back to Agedabia, occasionally turning to strike at pursuing British units. Just before Christmas, Gatehouse's 4th Armoured Brigade was pulled back to refit and the 22nd Armoured Brigade (2 RGH, 3 CLY, 4 CLY), still under Carr, took up the pursuit.

At Agedabia, Crüwell was able to assemble 41 tanks (including 28 Pz III and two Pz IV) from both Panzer divisions. When Carr's 22nd Armoured Brigade (with 35 Stuarts and 55 Crusaders) attempted to get around behind the Germans, the Afrika Korps was able to mount a short, powerful counter-attack on the afternoon of 27 December, while leaving Italian units to defend Agedabia. Although each side only lost a few tanks, Carr was wounded and Jago took command of the brigade. The British armoured brigade was also plagued by fuel shortages and mechanical breakdowns, whereas Crüwell now had two companies of new Pz III tanks and was closer to his source of supplies. In addition, the Luftwaffe was able to provide tactical air support, which the DAK had been sorely missing through much of November. Further skirmishing occurred on 28 December and Jago was injured. By this point, the 22nd Armoured Brigade was beginning to lose cohesion due to personnel losses and the poor mechanical condition of its tanks, which forced it onto the defensive. Crüwell mounted another major attack against the brigade on the morning of 30 December near El Haseiat, 50 kilometres south of Agedabia. Unlike earlier attacks where the German armour had kept its distance, this time the Panzers came on fast and they brought their 5cm Pak guns right up alongside, which enabled them to gain fire superiority. The 4 CLY was particularly hard hit, losing 12 tanks and having only five left by the end of the day. Likewise, the 2 RGH took a beating.[145] Altogether, the 22nd Armoured Brigade lost 60 tanks in four days of fighting, against 14 for the DAK. The British did succeed in capturing one new Pz III tank with only 400 kilometres on its odometer, which provided proof that the DAK had received at least some new tanks.[146]

At this point, the British reliance on the flimsy 18-litre container became a major issue, since Tobruk could only handle a limited logistic throughput. The RASC established a fuel depot at Msus, but 40 per cent of the fuel sent was lost en route due to leaking containers. Consequently, in late December only half the requested fuel was reaching Msus, which was now 100 kilometres from the frontline.[147] The situation with ammunition, food and water was even more critical.

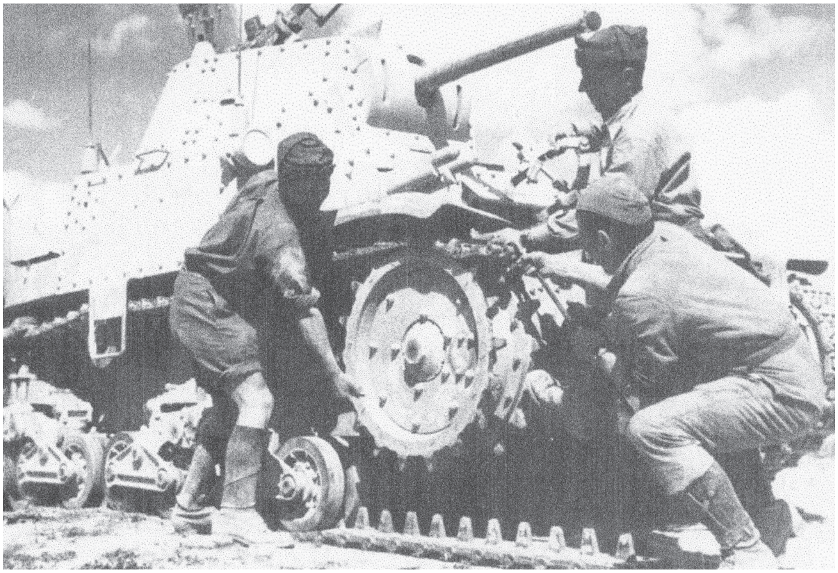
Given the tactical setback at El Haseit and growing British supply problems, Ritchie decided to temporarily halt the 8th Army's pursuit. Rommel's Afrika Korps had managed to conduct a skilful retreat, but its strength was greatly reduced and its prospects appeared poor as 1941 came to a close. Virtually the entire complement of 314 German tanks sent to North Africa in early 1941 had been lost, including 38 of 40 Pz IVs. Losses among personnel were equally grievous, including three Panzer division commanders, one Panzer regiment commander, two battalion commanders and multiple company commanders. Altogether, the DAK suffered over 11,000 dead or missing, or 17 per cent of its starting strength.[148] In the fighting around Tobruk and Sidi Rezegh, the DAK had also lost a great deal of equipment, including 25 armoured cars, 83 artillery pieces (including eight 8.8cm Flak and 34 anti-tank guns) and 390 trucks.[149] Furthermore, these losses must be placed in the context that the Wehrmacht was simultaneously engaged in a larger, more desperate campaign in the Soviet Union and could ill afford to divert tanks and personnel to rebuild Rommel's shattered command. Italian losses were also heavy and by the time that the 'Ariete' Division reached Agedabia it only had about 20 tanks still operational.

The 8th Army also suffered heavy losses in Operation *Crusader*, including roughly 800 tanks destroyed or in long-term repair. Since the British held the battlefield, they could expect to salvage and eventually return about half these tanks to service, although 278 tanks of all types were permantly lost.[150] Losses of motor transport, artillery and anti-tank guns had also been significant. Yet Auchinleck was expecting additional reinforcements, and planning for a follow-on operation, dubbed *Acrobat*, had begun even before Crusader ended. Churchill envisioned *Acrobat* to be a full-blooded drive on Tripoli to finish off the Afrika Korps, after a brief pause in Cyrenaica. Churchill also encouraged the concept of Operation *Gymnast* – an Anglo-American landing in French North Africa – as occurring soon after the onset of *Acrobat*. British intelligence assessments concluded that the Afrika Korps was a spent force and that one

A German Panzer unit occupying a desert laager for the night. Note soft-skin wheeled vehicles are concentrated in the centre of the formation and the tanks deployed facing outward in a rough circular formation. (SDZ, 02898896)

more good shove would finish them off. However, the Japanese declaration of war in the Far East, which threatened Britain's colonies in Burma and Singapore, immediately affected Auchinleck's ability to mount another offensive in North Africa. Not only were some expected reinforcements diverted to the Far East, but Auchinleck was directed to transfer troops, tanks, aircraft and artillery to Asia as well. The most significant loss was the 7th Armoured Brigade, which was to be transferred to Burma with the veteran 7th Hussars and 2 RTR, with a total of 100 newly delivered Stuart tanks.[151] By the end of December 1941, it was clear that finishing off Rommel was temporarily postponed.

In assessing the outcome of Operation *Crusader*, it is clear that Rommel made three key operational-level mistakes in November 1941: he failed to protect his air bases, he failed to protect his logistic support base and he inflicted unnecessary wear and tear on his armoured units, which seriously degraded their operational readiness. The loss of Sidi Rezegh and Gambut airfields early in the battle significantly reduced the amount of available tactical air support for Panzergruppe Afrika. German armoured warfare doctrine was designed around the implicit assumption that air support would be available when needed, but the loss of airfields curtailed the Luftwaffe's ability to support the battle. Instead, it was increasingly the DAK's columns that were being bombed and strafed. The abandonment of supply depots and repair units was also a serious misjudgement which prevented the DAK's armoured units from quickly restoring their combat effectiveness. As a commander, Rommel consistently sneered at logistic issues, but his decision to prioritize supporting isolated frontier garrisons over his support units was another serious mistake. Finally, Rommel's 'dash to the wire' antics inflicted further damage upon his worn-out tanks and exhausted crews for no real gains. If anything, Rommel's command performance during *Crusader* indicates that he



Italian *carristi* repairing the track on their M13/40 tank. Interestingly, the work is being done by the crew, not mechanics, and they seem to know how to handle a tanker's bar – an indication of improved training standards. (Filippo Cappellano)

remained ignorant about the technical and logistical constraints of armoured warfare and arrogantly refused to learn from more experienced subordinates.

Normally, the Italian efforts during Operation *Crusader* are pretty much ignored, but the performance of Gambara's CAM was actually satisfactory, inasmuch as the corps accomplished most of its assigned missions. The main problem with the CAM was that Rommel and Crüwell regarded the Italian mechanized corps as an afterthought and felt that vague guidance to Gambara was sufficient. Yet Rommel and Crüwell failed to appreciate that the orders process in the Regio Esercito was significantly different from in the Wehrmacht; Italian commanders expected detailed operational orders, not brief *Auftragstaktik*-style verbal mission orders. One serious blind spot in pre-war German doctrinal development was the failure to anticipate operations with Axis allies and modify its methods to promote efficient joint operations. Indeed, it is rather bizarre that Rommel wanted to command the CAM but had no Italian senior staff officers in the Panzergruppe command post. For the most part, this Axis blind spot remained uncorrected throughout the war in North Africa.

The performance of British senior leaders during *Crusader*, particularly in regard to the use of tanks in manoeuvre warfare, was generally poor. As commander of 7th Armoured Division, Gott not only allowed his combat power to disperse, but he failed to ensure that his brigades worked together. At critical moments in the battle, Gott always seemed to be in the wrong place, doing the wrong thing, while at other times he was apathetic and let situations spin out of control. Simply put, *Crusader* proved Gott was the wrong man to command an armoured division assigned to conduct a challenging mission. Likewise, Norrie seemed to exhibit a great deal of inertia and lacked the mental agility necessary to direct a corps-size mobile battle. Much of the fault for the lacklustre British operational-level performance in *Crusader* resides in pre-war training at Tidworth and staff training at Camberley, which did not anticipate fighting an aggressive peer-foe equipped with modern tanks and anti-tank guns. Even though 8th Army had 15 tank battalions committed to *Crusader*, it was never able to mass more than three against any one objective on a given day. Nagging communications problems at army-corps-division levels only served to exacerbate these conceptual deficiencies.

At the tactical level, the DAK's armoured tactics improved markedly as the campaign progressed, particularly in their ability to quickly smash isolated Allied units. However, the Germans recognized that their Pz III medium tank, equipped with the short 5cm L/42 cannon, was not significantly better in a firefight than British 2-pdr-equipped tanks, and tried to avoid costly head-on clashes of armour. In most actions, the DAK was able to mount combined arms attacks and their real trump card was the low-silhouette, high-velocity 5cm Pak 38 anti-tank gun. The DAK had limited quantities of tungsten-core APCR rounds, which could give them a long-range killing capability in some situations that the British lacked. The DAK also enjoyed an edge in heavy artillery, which played a significant role in their victories around Sidi Rezegh.

Italian armoured tactics during *Crusader* were conservative, but generally effective. The technical limitations of the M13/40 tank and training deficiencies of crews tended to lead to unnecessary casualties. Nevertheless, Italian *carristi* of late 1941 were far more capable than they had been at the start of the year. Unlike the Germans, the Italian CAM did not have high-quality artillery or anti-tank guns to compensate for the limitations of the M13/40, which meant that in armoured meeting engagements the Italian tanks usually suffered heavier losses. Another significant problem was the CAM's tendency to operate in a rather dispersed fashion, with the RECAM, the 'Ariete' Division and 'Trieste' Division, not fighting together as a team. Had Gambara insisted that his corps be assigned only one mission at a time and massed his forces together, this would have greatly multiplied Italian combat power on the battlefield.

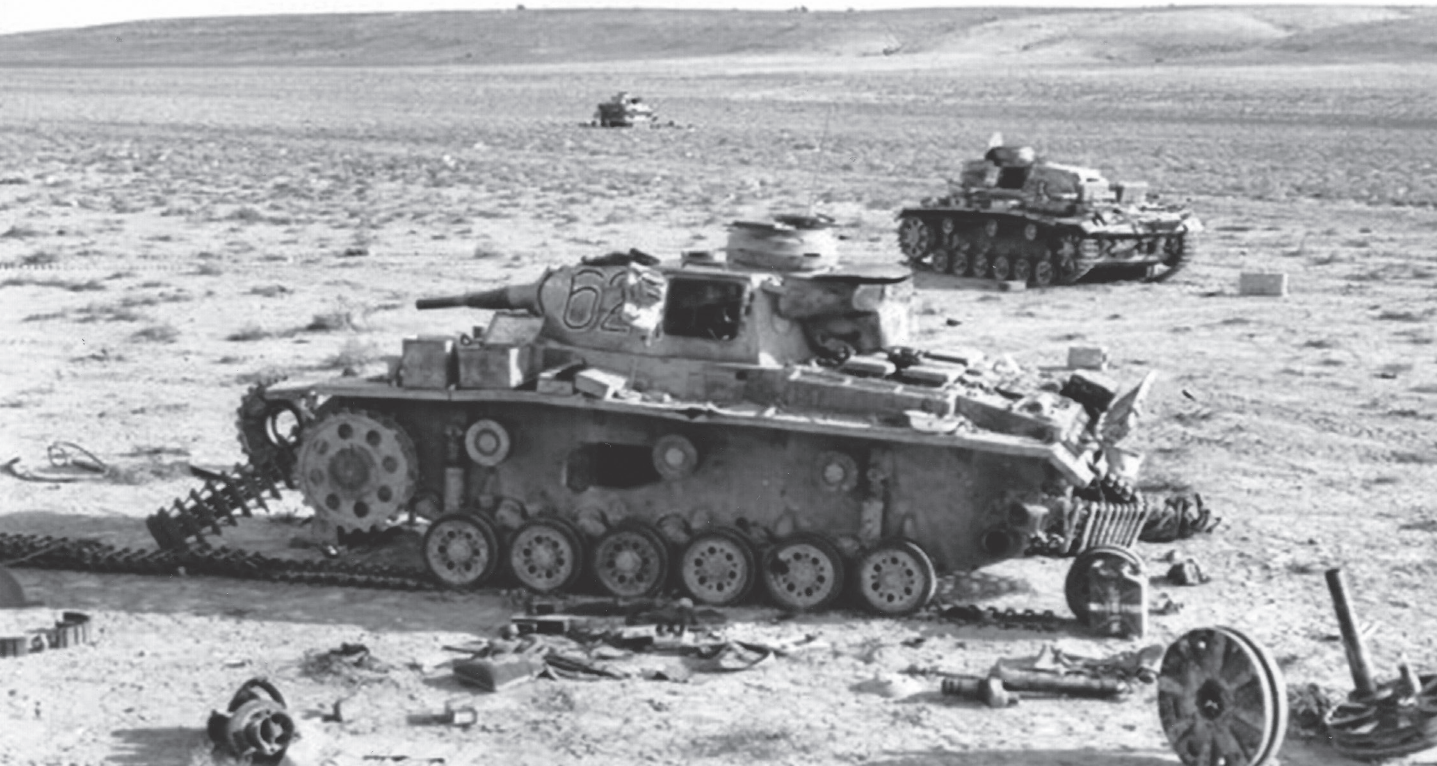
After *Crusader*, the British Army and later historians spent a great deal of time lamenting the alleged failings of the 2-pdr gun and the Crusader tank, while citing the technical superiority of German tanks and guns as the root cause of the 7th Armoured Division's poor showing. In particular, Auchinleck claimed that German tanks outgunned the British tanks as well as criticizing the combat value of the Stuart.[152] Lieutenant General Martel, one of the most senior figures in the RAC, also claimed that British tanks were 'outgunned' during Operation *Crusader*. Nevertheless, as far as tank versus tank combat in November–December 1941 goes, these criticisms have little merit. At that time, even without ballistic capped rounds, the 2-pdr gun was perfectly capable of defeating most enemy armour at ranges of 600–800 metres, occasionally at longer ranges. It was true that the Tzf 5e (*Turmzielfernrohr*) telescopic gunsight on the Pz III Ausf J had better magnification (2.5x versus 1.9x) than the British Telescope No. 30 on the Crusader or the M40 telescope on the Stuart (1.5x) and a wider field of vision (25° versus 21°), but this did not translate into a major tactical advantage. Many tank actions fought during *Crusader* were meeting engagements in which dust and smoke greatly obscured visibility, irrespective of zoom or FoV considerations. Likewise, the German tanks had a slight advantage over the system used in both the Crusader and the Stuart tanks in the gunner's ability to correct for fall of shot. On the other hand, the power traverse on the Crusader was superior to that on the German Pz III, which did provide a tactical advantage in close-range combat. The main point, left out of most technical assessments of the campaign, was that the fighting ability and bravery of British tank crews was outstanding throughout Operation *Crusader* and they were generally able to inflict proportionate losses on the enemy, unlike the Eastern Front, where German tankers in 1941 were able to inflict lop-sided losses on their Soviet opponents in most actions. While the lack of an HE round for the 2-pdr gun was a problem (the APHE round had been discontinued and 8th Army was only provided with solid shot), all British armoured brigades had at least one or two batteries of 25-pdr guns attached to engage enemy soft targets. By and large, this tactical system worked during *Crusader*, which is one of the reasons that the German 8.8cm Flak gun was less dominant in this battle.

It is clear that the British preference for using the 2-pdr gun while mounted on trucks (portee) against enemy tanks led to unnecessary losses in anti-tank units around Sidi Rezegh. When deployed on its ground mount, the 2-pdr had a height of 1.4 metres (the German 5cm Pak 38 was just 1.05 metres in height), which could be difficult to spot if properly concealed. However, when mounted on the back of various trucks, the 2-pdr portee was actually taller than a dismounted German 8.8cm Flak gun and more vulnerable to return fire. Had the British kept their 2-pdrs dismounted in action and only used trucks as prime movers, they would likely have achieved greater combat survivability and inflicted more damage upon the enemy.

Another item of concern raised after Operation *Crusader* was the claim that British-made tanks were more likely to burn when hit compared to German tanks. In most Second World War tank combat, about one-quarter of tanks that were penetrated by armour-piercing projectiles caught fire and burnt out. Some British commanders, such as Lieutenant Colonel Rowland F. E. Chute from 2 RTR, claimed that the German tanks were using 'thermite' or incendiary rounds, which caused British tanks to burst into flames. Other unsubstantiated anecdotal accounts supported this claim. Consequently, the 8th Army conducted a post-battle analysis on 31 burned-out British tanks on the Sidi Rezegh battlefield; it is important to note that the study did not validate what percentage of British tanks burned when hit, merely why these particular tanks burned. The results were surprisingly inconclusive. While the officers noted that the manner in which 2-pdr ammunition was exposed around the turret – vulnerable to ignition of their cordite propellant if hit by hot fragments – was a factor, they also noted that many materials within the turret of the Crusader were flammable. It was also claimed that German tanks were less likely to burn because most of the ammunition stowed inside the Pz III was in sheet metal lockers, but the study produced no estimate of how many German tanks were burnt out.[153] Thus, this cursory post-mortem study failed to determine if British tanks caught fire more easily than German tanks and only deduced some reasons for tank fires based on a limited collection of vehicles. Another factor which the study did mention was the fact that many units ordered crews to carry extra fuel and ammunition both inside and outside their vehicles. Indeed, Lieutenant Stuart Hamilton in 8 RTR noted that one of his sergeant's tanks burst into flames when hit because 'the idiot had forgotten to jettison some spare cans of diesel he had been carrying on the outside and they had been hit and set alight.'[154]

While British officers did admire the mechanical reliability of the American-made Stuart, they criticized the limitations of its M40 telescopic sight (which was soon improved with the M54 sight), lack of turret basket and limited range. British-made tanks were also criticized for serious mechanical defects that led to heavy attrition, but the tactical setbacks suffered during Operation *Crusader* were not due to the perceived technical inadequacies of available equipment but rather to mistakes made by British commanders. Simply put, the British tactical commanders did not understand how to create combat synergy, whereby greater combat power is produced than the simple sum of its components. Instead, they simply assumed that by placing various arms under one commander, they would be used in co-ordinated fashion.

While the 8th Army had made some improvements since *Brevity* and *Battleaxe*, overall the use of combined arms tactics remained pretty spotty. The



An abandoned Pz III medium tank near Belhamed. Mechanics from the Panzer-Werkstatt Kompanie have dis-assembled the final drive, which is a major piece of work. Note the tools left behind – these will have to be replaced, as well. (Author's Collection) infantry tank battalions attached to XIII Corps and the Tobruk garrison did work fairly well with infantry and artillery support, but the 7th Armoured Division often fought tank-pure or tank-heavy actions. At no time did any two British armoured brigades effectively work together on the battlefield, in part due to communications issues, but also due to the limited large-scale training conducted prior to *Crusader*. Instead, each armoured brigade team acted as if it was a world unto itself. British and South African armoured reconnaissance units were also noticeably less aggressive and less effective than in earlier campaigns, choosing to remain close to the nearest armoured brigade rather than ranging far and wide into enemy rear areas. On the other hand, RAF tactical air support was noticeably improving and this was beginning to cause problems for the Afrika Korps. The main problem with tactical air support in *Crusader* was that it was difficult for aircraft to identify valuable enemy targets on a fluid battlefield, and, due to XXX Corps' failure to properly plan for the integration of air support into its operations, a large number of on-call sorties were wasted.

Both sides made serious mistakes during Operation *Crusader* and victory swung back and forth around Sidi Rezegh for several days. Ultimately, the 8th Army pulled off a victory due to superior logistics and an unwillingness to quit, even when the tactical situation was not particularly favourable. It should also be noted that the large-scale provision of American-made Stuart tanks and trucks gave the 8th Army an edge in mobility that it would not otherwise have possessed. While Panzergruppe Afrika came close to achieving victory, it was ultimately let down by the vagaries of its egocentric commander.

THE DESERT WAR AT MIDPOINT

Italy tried to deploy a partly mechanized army to the North African theatre in 1940–41, only to see it obliterated in a matter of three months. The Italian *carristi* demonstrated considerable bravery and self-sacrifice on the battlefield, but the technical limitations of the M13/40 tank greatly inhibited their ability to achieve meaningful results. While the M13/40, armed with a 47/32 cannon and a maximum of 30mm armoured protection, was a competitive design in 1940–41, it clearly had a limited future. Under the right conditions, such as Bir el Gubi, Italian *carristi* could defeat British units equipped with cruiser tanks, particularly when those units were inexperienced and poorly led. Italian industry struggled just to manufacture adequate numbers of M-series medium tanks in order to re-equip shattered units in North Africa, leaving virtually no capacity left for developing better armoured fighting vehicles. As it was, the Regio Esercito did not have even a single fully equipped and trained armoured division until over a year after the war in the desert started and they would not have an armoured corps until mid-1942.

In early 1941, Germany committed two nearly full-strength Panzer divisions with over 300 tanks to the North African theatre. Germany's

Panzertruppe entered the desert war with a battle-proven doctrine for conducting combined arms warfare, tanks that were effective and capable of further technical improvements and well-trained leaders and crews; all in all, a recipe for success. When the DAK was conceived in the winter of 1940/41 as an economy of force operation, it was only intended to prevent Italy from suffering a rapid and catastrophic defeat in North Africa, but no more. The expeditionary forces deployed to the North African theatre were hastily assembled from available spare resources, but they were not elite units by any measure (selection, training or battle experience). In strategic terms, the DAK was simply supposed to hold off the British Army in North Africa while the bulk of Germany's Panzer forces (19 of 21 Panzer divisions) were used to crush the Soviet Red Army in a rapid campaign that would decide the war. After victory was achieved in Russia, reinforcements would be sent to deal with the British armies in the Middle East.

Yet from the start, both Rommel and the OKH worked to increase the stakes in North Africa by committing a quantity and quality of armoured equipment that far exceeded the requirements necessary for a simple holding action. Part of the problem was that, in the early stages of the Second World War when Germany held the strategic initiative, Wehrmacht leaders regarded the defence as only a temporary measure. Sitting on the defence was incongruent with von Seeckt's lessons about seizing the initiative in a campaign. The other part of the equation is that both Rommel (for personal reasons) and the OKH hungered for prestige victories over British forces. Having failed to destroy the BEF in France or invade England in 1940, defeating Britain's armies in the Middle East was regarded as the next best thing. Consequently, as long as Rommel could deliver tactical successes, he would be rewarded with his pick of Germany's available armoured equipment. Unlike other contemporary Heer Panzer divisions, the DAK was never forced to accept Czech-designed Pz35(t) or Pz38(t) tanks, even though six Panzer divisons on the Eastern Front had to use them. Rather, the DAK was consistently provided with more and better tanks than most of the Panzer divisions fighting on the Eastern Front. Throughout 1941–42, Rommel only had two of the Wehrmacht's 21 Panzer divisions (with a total of just four out of 60 active Panzer battalions), yet he was receiving more than 15 per cent of new tank production.

Despite advantages in equipment, doctrine and tactical leadership, the Afrika Korps actually failed to capture any significant objectives – aside from Bengazhi – in its first nine months of active desert campaigning. By the end of 1941, Rommel found himself back at his original starting point at El Agheila, minus virtually the entire German investment of 300 tanks. Strip away the hype created by Rommel's propaganda machine, and it is clear that Rommel's 1941 campaign was nearly as disastrous as Graziani's 1940 campaign. The reasons for failure, as discussed in earlier sections, were primarily Rommel's unsuitability for independent command and secondly insufficient Axis theatre logistics to sustain the kind of high operational tempo demanded by German mechanized warfare doctrine. For the most part, Rommel ignored theatre logistics and was technically ignorant about the actual capabilities of his Panzer forces, so defeat was not a surprising outcome. By the end of 1941, the OKH and Commando Supremo should have been doing a serious re-think on commitments to North Africa. The campaign in Russia had turned sour and Germany needed to focus its resource on the war in the East, not be distracted by the prospect of capturing more sand. Instead, Rommel the con artist managed to convince his chain of command to double down on their strategic investment in North Africa – providing him with another 300 tanks so he could make a second attempt against Tobruk in 1942. Having built up Rommel's battlefield exploits in 1941, the German high command could not easily deny more tanks to the Afrika Korps without admitting defeat in North Africa.

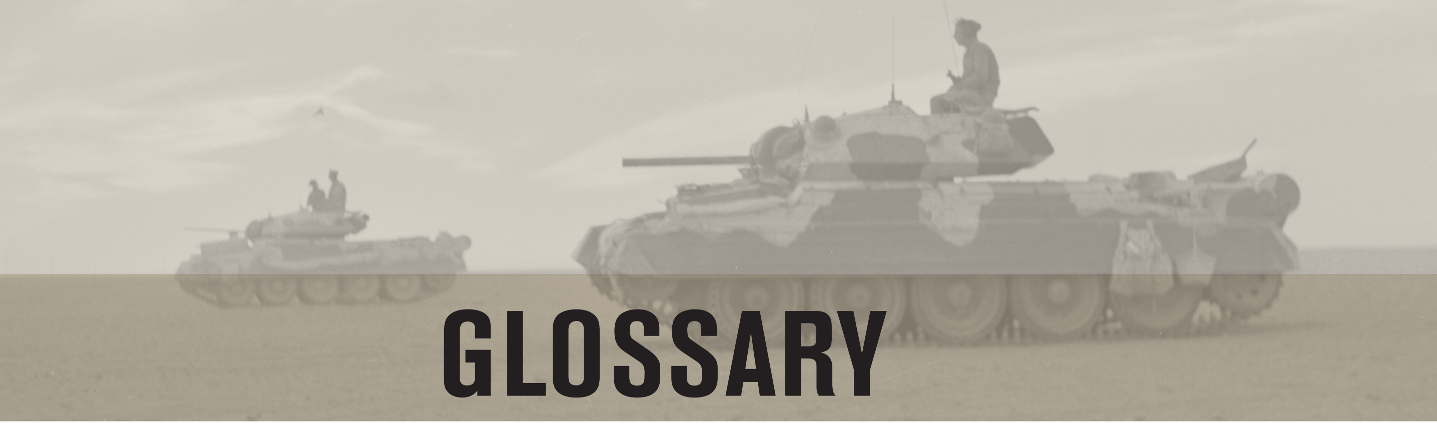
Although the British Army had suffered a number of tactical defeats in the desert, it could reflect with some pride that it had ended the campaigns of

A Stuart tank destroyed near Derna during the pursuit, mid-December 1941. The short-ranged Stuart was poorly suited to pursuit operations. (IWM, E 7284)

both 1940 and 1941 with victory nearly at hand. The British Army came to the Desert War with essentially two different concepts of how to use armour – either as fast, independent mechanized units capable of rapid manoeuvre or as plodding tools of infantry support. Both concepts worked well against the Regio Esercito in the first six months of the campaign, but then frequently misfired against the Afrika Korps. Unlike pre-war expectations based upon small-scale experiments at Tidworth, large-scale mechanized envelopments rarely achieved decisive effects, often for the most mundane of reasons, such as communications problems. Whereas the German armoured units understood that tactical communications needed redundancy and leaders who knew how to use secure radio communications on the battlefield, too many British brigade- and division-level armoured leaders had an insouciant attitude about tactical radio nets. The British Army's pre-war exercises had failed to reveal that tactical networks might fail at the worst possible times or that the loss of even a few headquarters vehicles could leave an entire armoured division deaf and dumb in the desert.

British tanks and armoured warfare doctrine had proved generally adequate in the first 18 months of the Desert War, even if mechanical reliability and the limitations of the 2-pdr gun were problematic at times. New weapons, including the American-built Grant medium tank and the British-built 6-pdr anti-tank gun, would be arriving in theatre in early 1942. British theatre logistics were also rapidly improving and gave the 8th Army a major advantage in a protracted campaign. The only real cloud hanging over British armoured operations was the vagaries of senior leaders who shifted between over-aggressive use of armour to overly passive, wait-and-see methods. At the troop, squadron and battalion level, British tankers were as good as most of their opponents, but at the brigade level there was considerable inertia and at division/corps level rank incompetence had become the norm. Unfortunately, in reviewing the lessons of operations *Battleaxe* and *Crusader*, the British tended to focus more on the perceived technical deficiencies of their tanks rather than the actual deficiencies in battle command.

A tank is a weapon system that can only be effective when it has a well-trained crew, is provided with adequate logistic support and directed by leaders who understand armoured warfare doctrine and know how to put it into practice. Subtract any of these factors and the result is likely to be excessive burning wreckage and dead crews in the desert. After 18 months of armoured combat in North Africa, it was clear that both sides suffered from limitations, although neither side was eager to correct their own deficiencies. Instead, both Panzergruppe Afrika and the 8th Army would rebuild their depleted armoured units and move forward into the 1942 campaign season, confident that they could achieve a crushing victory in the next round.



GLOSSARY

GENERAL TERMINOLOGY

AFV	Armoured Fighting Vehicle
AP	Armour Piercing
APBC	Armour Piercing Ballistic Cap
APHE	Armour Piercing High Explosive
C2	Command & Control
cbm	cubic metre of fuel, equivalent to 5,000 litres or 739kg
FHA	Face Hardened Armour
HEAT	High Explosive Anti-tank
RHA	Rolled Homogenous Armour

COMMONWEALTH TERMINOLOGY

2L&BH	2nd Lothians and Border Horse
CIGS	Chief of the Imperial General Staff
CLY	County of London Yeomanry
cwt	hundredweight (1 cwt = 50.8kg)
DMI	Director of Military Intelligence
EMF	Experimental Mechanized Force
FSD	Field Supply Depot
GSO	General Staff Offi
HAC	Honourable Artillery Company
KDG	King's Dragoon Guards
KRRC	King's Royal Rifle Corp
MWEE	Mechanical Warfare Experimental Establishment
NIH	North Irish Horse
RAOC	Royal Army Ordnance Corps
RAC	Royal Armoured Corps
RAF	Royal Air Force
RASC	Royal Armoured Service Corps
RB	Rifle rigade
RE	Royal Engineers
RGH	Royal Gloucestershire Hussars
RHA	Royal Horse Artillery
RSG	Royal Scots Greys
RTR	Royal Tank Regiment
RWY	Royal Wiltshire Yeomanry

SAACR	South African Armoured Car Regiment
TA	Territorial Army

GERMAN TERMINOLOGY

A.A.	Aufklärungs-Abteilung (Reconnaissance Battalion)
AOK	Armeeoberkommando (Army)
DAK	Deutsches Afrika Korps (Africa Corps)
FJR	Fallschirmjäger-Regiment
Flak	Flugabwehrkanone (anti-aircraft gun)
Gefechtstroß	Combat trains, including ammunition trailers
Gep.	Gepanzert (armoured)
Gepäcktroß	Baggage train, including field kitchen
gl.	Geländegängig (cross country)
HKL	Hauptkampflinie (main line of resistance)
I-gruppe	Instandsetzungsgruppe (Repair Group)
Kfz.	Kraftfahrzeug (motor vehicle)
Kradschützen	Motorcycle infantry
LKW	Lastkraftwagen (truck)
MFP	Marinefährprahm (motorized barges)
M.G. Btl.	Maschinengewehr-Bataillon (machine-gun Battalion)
OKH	Oberkommando des Heeres (German Army High Command)
OKW	Oberkommando der Wehrmacht (High Command of Armed Forces)
Pak	Panzerabwehrkanone (anti-tank gun)
PKW	Personenkraftwagen (motor car)
Pz.Abt.	Panzer-Abteilung
Pz.Regt.	Panzer-Regiment
PZAOK	Panzerarmee
Pzgr	Panzergranate (armour-piercing round)
Pz.jg.-Abt.	Panzerjäger-Abteilung
Pzkw	Panzerkampfwagen (armoured fighting vehicle or tank)
Sd.Kfz.	Sonderkraftfahrzeug (special military vehicle)
Sfl.	Selbstfahrlafette (self-propelled gun)
SPW	Schützenpanzerwagen (armoured infantry vehicle)
SR	Schützen-Regiment (motorized infantry)
TP	Tropisch (tropical)
V.A	Vorausabteilung (advanced guard battalion)
V.S.	Verbrauchssatz (unit of issue, logistics)
Zgkw.	Zugkraftwagen (half-track pulling vehicles)

ITALIAN TERMINOLOGY

ACIT	Armata Corazzata Italo-Tedesca (Italian-German Tank Army)
A.S.	Africa Settentrionale (Northern Africa)

Btgl. Carri L.	Battaglione Carri Leggeri (light tank battalion)
Btgl. Carri M.	Battaglione Carri Medi (medium tank battalion*)*
CC.NN	Camicie Nere (Blackshirts, Fascist militia units)
E.P.	Effetto Pronto (HEAT-type projectiles)
SIM	Servizio Informazioni Militari (Military Intelligence)
Superasi	Comando Superiore Africa Settentrionale (Commander-in-chief North Africa)

AMERICAN TERMINOLOGY

AFAB	Armored Field Artillery Battalion
AIB	Armored Infantry Battalion (mechanized infantry)
AR	Armor (Battalion)
CC(A, B, C)	Combat Command A, B or C
FAB	Field Artillery Battalion
GMC	Gun Motor Carriage
RCT	Regimental Combat Team

RANK TABLE

Royal Italian Army	German Army	Britsh Army	US Army Rank
Maresciallo d'Italia	Generalfeldmarschall	Field Marshall	General of the Army
Generale d'Armata	Generaloberst	General	General
Generale di Corpo d'Armata	General der (Panzertruppe)	Lieutenant General	Lieutenant General
Generale di Divisione	Generalleutnant	Major General	Major General
Generale di Brigata	Generalmajor	Brigadier	Brigadier General
Colonnello Comandante			
Colonnello	Oberst	Colonel	Colonel
Tenente Colonnello	Oberstleutnant	Lieutenant Colonel	Lieutenant Colonel
Maggiore	Major	Major	Major
Primo Capitano			
Capitano	Hauptmann	Captain	Captain
Primo Tenente	Oberleutnant	First Lieutenant	First Lieutenant
Tenente	Leutnant	Second Lieutenant	Second Lieutenant
Sottotenente			

APPENDICES

APPENDIX 1: MAJOR TANK DELIVERIES TO NORTH AFRICA, 1940–41

AXIS

Date	Port	Equipment	Unit
8 July 1940	Benghazi	72 M11/39 tanks	I and II Battaglioni Carri Medi, Ariete
12 October 1940	Tripoli	37 M13/40 tanks	III Battaglione Carri Medi
12 December 1940	Benghazi	37 M13/40 tanks	V Battaglione Carri Medi
22 January 1941	Benghazi	37 M13/40 tanks +36 replacement tanks	VI Battaglione Carri Medi
25–28 February 1941	Tripoli	2 Pz II, 2 Pz III, 2 Pz IV	Panzer-Regiment 5
4–7 March 1941	Tripoli	25 Pz I, 36 Pz II, 60 Pz III, 16 Pz IV	Panzer-Regiment 5
11 March 1941	Tripoli	46 M13/40 tanks	VII Battaglione Carri Medi
11 March 1941	Tripoli	5 Pz I, 5 Pz II, 2 Pz III	Panzer-Regiment 5
15 March 1941	Tripoli	27 Panzerjäger I	Panzerjäger-Abteilung (Sfl) 605
17–19 April 1941	Tripoli	11 Pz II, 19 Pz III	Stab, 1./Panzer-Regiment 8
24 April 1941	Tripoli	20 Pz II, 37 Pz III, 8 Pz IV	2.,3.,5./Panzer-Regiment 8
29 April 1941	Tripoli	15 Pz II, 21 Pz III, 10 Pz IV	6.,7./Panzer-Regiment 8
Late April 1941	Tripoli	46 M13/40 tanks	VIII Battaglione Carri Medi
Early June 1941	Tripoli	15 Pz III, 5 Pz IV	Replacements for Panzer-Regiment 5
October 1941	Tripoli	46 M13/40 tanks	IX Battaglione Carri Medi
23 November 1941	Tripoli	10 M13/40	
1 December 1941	Tripoli	14 M13/30	
19 December 1941	Benghazi M.42 Convoy	5 Pz II, 17 Pz IIIJ	3./Panzer-Regiment 8
19 December 1941	Tripoli M.42 Convoy	6 Pz II, 17 Pz III	7./Panzer-Regiment 8

ALLIES

Date	Port	Equipment	Unit
15 September 1940	Alexandria (RS 5)	10 A9	
23 September 1940	Suez (AP.1 Convoy)	50 Matilda II 18 A13 28 A10 6 A9CS 63 Mk VIb	2 RTR, 7 RTR, 3rd Hussars
November 1940		18 A10	
22 December 1940	Suez (WS.4A Convoy)	58 A13 32 A10 12 A10CS 52 Mk VIb	3 RTR, 5 RTR
28 December 1940	Suez (Convoy WS.4B)		HQ 1st Armoured Division, HQ 1t Armoured Brigade, 4th Hussars,1 KDG
16 February 1941	(Convoy WS.5A)	38 Matilda II 8 Mk IVA 6 Mk VIc	4 RTR (less one squadron)
12 May 1941	Alexandria (Tiger convoy/WS. 8A)	135 Matilda 15 Mk IVA 67 Mk VI 21 Mk VIC	1st Army Tank Brigade (8 RTR, 42 RTR, 44 RTR) + reserves
4 July 1941	WS.8b	12 Matilda II 14 cruiser	
15 July 1941	WS.8x	14 Matilda II 36 Valentine 44 Mk IVA 6 Mk VI 1 light	Also 15 scout cars
19 July 1941		36 M3 Stuart 4 M2A4	
July 1941	WS.9	20 I tank 20 Cruiser	Also 25 Daimler/Humber armoured cars
August 1941		69 M3 Stuart	8th Hussars
23 September 1941	WS.10	30 I tank 21 cruiser	Also 25 Daimler/Humber armoured cars
September 1941		53 M3 Stuart	
2 October 1941	Suez (WS.10x)	166 cruiser	22nd Armoured Brigade (RGH, 3 CLY, 4 CLY)

October 1941	WS.11	60 I tank 20 Crusader	Elements 1st Armoured Division, 12th Lancers. Also 50 Daimler/Humber armoured cars
October 1941		150 M3 Stuart 2 M3 Grant	
28 November 1941	WS.12	52 I tank 124 cruiser 60 M3 Stuart	2nd Armoured Brigade (9L, 10H, 2QB), 12 Royal Lancers (83 Daimler/Humber armoured cars)
November 1941		8 M3 Stuart 1 M3 Grant	
December 1941		86 M3 Stuart 11 M3 Grant	
The SS *Empire Song* was sunk by two mines off Malta on 9 May 1941. It was carrying all of 8 RTR's tanks: 50 Matilda II and 7 Mk VIc light tanks, plus 5 Mk IVA cruisers.			

APPENDIX 2: TANKS IN NORTH AFRICA, 1940–41

AXIS TANKS

	Pz IIB	Pz IIIG	Pz IIIJ	Pz IVE	M11/39	M13/40
Introduced	February 1937	April 1940	March 1941	October 1940	July 1939	July 1940
Weight (metric tons)	8.9	19.8	21.6	22.0	11.1	14
Crew	3	5	5	5	3	4
Engine	Maybach HL 62 TR	Maybach HL120TR	Maybach HL120TRM	Maybach HL120TRM	Fiat SPA 8T	Fiat SPA 8T
Horsepower	140	265	265	265	125	125
HP: weight ratio	15.7	13.3	12.2	12	11.1	8.9
Suspension	Leaf Spring	Torsion Bar	Torsion Bar	Leaf Spring	Leaf Spring	Leaf Spring
Max speed (road) (kph)	40	40	40	42	32	31
Average speed (cross-country) (kph)	12–15	12–15	12–15	20	12	15
Fuel type	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel
Fuel capacity (litres)	170	320	320	470	145	210
Range (kms)	190 (road) 126 (CC)	155 (road) 95 (CC)	145 (road) 85 (CC)	210 (road) 130 (CC)	210 (road) 120 (CC)	200 (road) 120 (CC)
Track width (cm)	30	38	40	40	26	26
Main gun	2cm Kw.K 30 L/55	5cm Kw.K 38 L/42	5cm Kw.K 38 L/42	7.5cm Kw.K L/24	37mm L/40	47mm L/32
Other weapons	1 MG34	2 MG34	2 MG34	2 MG34	2 8mm MG Breda	3 8mm MG Breda
Ammo type	AP/HE	HE/APCBC	HE/APCBC	APC/HE	AP/HE	APBC/ HE
Ammunition	180	99	99	80	84	85
Frontal armour (mm)	20+14.5	30	50	30+30	30	30–40
Side armour (mm)	14.5	30	30	20+20	15	25
Rear armour (mm)	14.5	21–30	30	20	8	25
Radio	Fu 2/5	Fu 2/5	Fu 5	Fu 5	None	None*

Notes: (CC) cross-country, + indicates possible bolt-on additional armour plating, * Marelli RF 1 CA radio (mid-1941).

ALLIED TANKS

	A-9 Cruiser Mk I	A-10 Cruiser Mk II	A-13 Cruiser Mk IV	Matilda Mk II	Valentine Mk III	M3 Stuart Mk I
Introduced	January 1939	December 1939	April 1939	September 1939	June 1940	March 1941
Weight (metric tons)	12.75	14.3	14.75	25	17.0	13.0
Crew	6	5	4	4	3	4
Engine	AEC Type A179	AEC Type A179	Nuffield Liberty II	2x AEC/ Leyland	AEC A189 AEC A190	Continental W-670 or Guiberson T1020
Horsepower	150	150	340	188	135	250
HP: weight ratio	11.7	10.5	23.0	7.52	7.9	19.2
Suspension	Coil springs	Coil springs	Christie	Coil springs	Coil springs	Volute springs
Max speed (road) (kph)	40	40	49	24	24	58
Average speed (cross-country) (kph)	16	16	16	8	9	29
Fuel type	Gasoline	Gasoline	Gasoline	Diesel	Gasoline/Diesel	Gasoline/Diesel
Fuel capacity (litres)	327	445	454	211	234	151
Range (kms)	200 (road) 116 (CC)	225 (road) 129 (CC)	160 (road) 110 (CC)	113 (road) 69 (CC)	164 (road) 116 (km)	120 (road) 80 (CC)
Track width (cm)	26.6	26.6	24.6	35.5	36.5	29.5
Main gun	2-pdr (40mm)					37mm L/56
Other weapons	3 7.7mm MG	2 7.7mm MG	1 7.92 coax (Besa)			3 7.62mm MG
Ammo type	AP-T	AP-T	AP-T	AP-T	AP-T	AP-T
Ammunition	100	100	87	93	53	83
Frontal armour (mm)	10–14	11–30	20–30	47–78	30–65	38
Side armour (mm)	10–12	11–13	14	25–75	60	25
Rear armour (mm)	10–14	12–15	14	55–75	17–60	25
Radio	No. 9 W/T			No. 11 W/T		

Note: On 3 June 1940, the British Army standardized the nomenclature for its cruiser tanks as follows: the A9 was the Cruiser Mk I; the A10 as the Cruiser Mk II and Cruiser Mk IIA; the four versions of the A13 as Cruiser Mk III, IV, IVA and V; the A15 as the Cruiser Mk VI.

APPENDIX 2B: PENETRATION OF TANK AND ANTI-TANK GUNS, 1940–43

AXIS WEAPONS

Weapon	Round	Projectile Weight (kg)	Muzzle Velocity (m/Sec)	Penetration at range (mm)			
				100	500	1,000	1,500
47mm L/32	Perforante 35 (AP)	1.42	630	55	43	31	23
	Perforante 39 (APBC/HE)	1.44	630	39	35	30	25
3.7cm Pak L/45	Pzgr (AP-T)	0.68	762	35	29	22	20
	Pzgr 39 (APCBC-HE)			41	35	29	24
	Pzgr 40 (APCR-T, Hk)	0.35		64	34	--	--
4.7cm Pak L/50	Pzgr (AP)	1.65	775	52	47	40	35
5cm KwK L/42	Pzgr (AP-T)	2.06	685	53	43	32	24
	Pzgr 39 (APCBC-HE)			54	46	36	28
	Pzgr 40 (APCR-T, Hk)	0.925	1,050	94	55	21	--
5cm KwK L/60	Pzgr (AP-T)	2.06	835	67	57	44	34
	Pzgr 39 (APCBC-HE)			69	59	47	37
	Pzgr 40 (APCR-T, Hk)	0.925	1,180	130	72	38	--
7.5cm KwK L24	K.Gr.rot.Pz. (APC)	6.8	385	41	38	35	32
	Gr. 38 HI/A (HEAT)	4.4	450	70			
7.5cm KwK L/43	Pzgr 39 (APCBC-HE)	6/8	740	99	91	81	72
	Pzgr 40 (APCR-T, Hk)	4.1	990	126	108	87	
7.62cm Pak 36(r)	Pzgr 39 (APCBC-HE)	7.54	740	106	98	88	79
8.8cm Flak L/56	Pzgr 39 (APCBC-HE)	10.2	820	120	110	100	91
	Pzgr 40 (APCR-T)	7.5	935	171	156	138	123

Note: The Germans began to deploy tank and anti-tank rounds with Tungsten cores (APCR) in September 1940, beginning with the 3.7cm Pzgr Patr 40, which offered greatly improved penetration capability. In March 1941, the 5cm Pzgr Patr 40 was introduced. However, due to the scarcity of Tungsten, only about 5–6 per cent of 3.7cm and 5cm rounds in June 1941 were of this type.
Panzergranate 39 (Pzgr 39), standard anti-tank round with steel core. Panzergranate 40 (Pzgr 40), armour-piercing composite rigid (APCR) anti-tank road with Tungsten core. Also referred to as *Hartkern* (hard core) munition or HK.

ALLIED WEAPONS

Weapon	Round	Projectile Weight (kg)	Muzzle Velocity (m/Sec)	Penetration at range (mm) against RHA			
				100	500	1,000	1,500
2-pdr (40mm)	AP-T	1.08	792	50	42	36	17
	APHV-T	1.08	853	57	51	41	28
37mm L/53	AP-T (M74)	0.87	884	85	65	45	24
	APC-T (M51)	0.87	853	66	44	26	15
6-pdr L/43 (57mm)	AP	2.86	853	97	82	66	53
	APC		846	106	89	72	59
75mm L/31	AP-T (M72)	6.32	563	95	81	66	54
	APC-T (M61)	6.63		78	72	65	58
75mm L/40	AP-T (M72)	6.32	618	109	92	76	62
	APC-T (M61)	6.63		102	95	86	79

Note: HVAP High-velocity armour piercing (US name for APCR). The American-made M51 APC projectile was produced in several variants (steel and brass cartridge cases, rounded or pointed ballistic caps, different propellant) in 1941–43, which resulted in different performance characteristics.

APPENDIX 3: ORDERS OF BATTLE FOR ARMOURED UNITS IN NORTH AFRICA, 1940–41

SIDI BARRANI, 9 DECEMBER 1940

Axis

Commander in Chief North Africa (Superasi) Maresciallo Rodolfo Graziani
10ª Armata (Generale d'Armata Italo Gariboldi)
XXI Corps (Generale di Corpo d'Armata Carlo Spatocco)
 63ª Divisione Fanteria 'Cirene', 64a Divisione fanteria 'Cantanzaro'
  XX, LXIII Battaglione Carri Leggeri [each 46 CV-33/35]

XXIII Corps (Generale di Corpo d'Armata Annibale Bergonzoli)
 4a CC.NN. Division 3 Gennaio, 62a Divisione fanteria 'Marmarica'
  LXI, LXII Battaglione Carri Leggeri [each 46 CV-33/35]

Libyan Group (Generale di Corpo d'Armata Sebastiano Gallina)[1]
 2ª Divisione Libica
  IX Battaglione Carri Leggeri [29 CV-33/35]

Raggruppamento Maletti (Generale Pietro Maletti)[2]
  II Battaglione Carri Medi [22 M11/39]

Under Army control:
Brigata Corazzata Speciale (Generale di Brigata Valentin Babini)
  I Battaglione Carri Medi [40 M11/39]
  III Battaglioni Carri Medi [37 M13/40]
  XXI Battaglione Carri Leggeri [4x CV-33/35]
  LX Battaglione Carri Leggeri [28 CV-33/35]

Allies

Middle East Command (General Archibald Wavell)
Western Desert Force (Lieutenant General Richard O'Connor)
Under Corps Control:
  7 RTR (Lieutenant Colonel Roy M. Jerram) [47 Matilda Mk II]

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[1] Captured 10 December 1940
[2] Killed in action 9 December 1940

- 7th Armoured Division (Brigadier John A. L. Caunter)[1]
- 4th Armoured Brigade (Colonel Horace L. Birks)
  - 2 RTR (Lieutenant Colonel Alexander C. Harcourt) [38 cruiser, 16 light]
  - 6 RTR (Lieutenant Colonel Leonard S. Harland) [32 cruiser, 16 light]
  - 7th Queen's Own Hussars [7H] (Lieutenant Colonel Frederick W. Byass) [16 cruiser, 32 light]

- 7th Armoured Brigade (CO: Brigadier Hugh E. Russell, 2IC: Colonel Alexander H. Gatehouse)
  - 1 RTR (Lieutenant Colonel George J. N. Culverwell) [23 cruiser, 26 light]
  - 3rd King's Own Hussars [3H] (Lieutenant Colonel George E. Younghusband) [16 cruiser, 36 light]
  - 8th King's Royal Irish Hussars [8H] (Lieutenant Colonel T. G. Watson) [14 cruiser, 35 light]
  - 11th Hussars (Lieutenant Colonel John F. B. Combe) [*c.* 30 armoured cars]
    - No. 2 Armoured Car Company, RAF

5–7 FEBRUARY 1941 BEDA FOMM

Axis

- 10ª Armata (Generale d'Armata Giuseppe Tellera)[2]
- XX Corps (Generale di Corpo d'Armata Ferdinando Cona)
- Brigata Corazzata Speciale (Generale di Brigata Valentin Babini)[3]
  - III Battaglione Carri Medi (Tenente Colonnello Carlo Ghioldi) (12x M13/40)
  - V Battaglione Carri Medi (Tenente Colonnello Emilio Iezzi) (24x M13/40)
  - VI Battaglione Carri Medi (Maggiore Ornano) (28x M13/40)
  - LX Battaglione Carri Leggeri (11x CV33/35)

- Raggruppamento Bignami (Generale di Brigata Mario Bignami)[4]
  - XXI Battaglione Carri Medi (Capitano Giuseppe Sciacchitano)[5] (37x M13/40)

Allies

- Middle East Command (General Archibald Wavell)
- XIII Corps (Lieutenant General Richard O'Connor)
- 7th Armoured Division (Major General Michael O'Moore Creagh)
- 4th Armoured Brigade (Brigadier John A. L. Caunter)
  - 2 RTR (Lieutenant Colonel Alexander C. Harcourt) [12 cruiser, 7 light]
  - 3rd King's Own Hussars [3H] (Lieutenant Colonel George E. Younghusband) [7 cruiser, 6 light]
  - 7th Queen's Own Hussars [7H] (Lieutenant Colonel Frederick W. Byass) [1 cruiser, 29 light]

- CombeForce (Lieutenant Colonel John F. B. Combe)
  - C Squadron, 11th Hussars [12 Rolls-Royce/CS9 armoured cars]

[1] Major-General Michael O'Moore Creagh was ill at the start of Operation *Compass and temporarily replaced by Caunter.*

[2] Killed in action 6 February 1941

[3] Captured 7 February 1941

[4] Captured 7 February 1941

[5] Killed in action 6 February 1941

B Squadron, King's Dragoon Guards (KDG) [12x Marmon-Herrington armoured cars]
Support: 2nd Battalion, Rifle Brigade, C/4 RHA [8x 25-pdr], 106 RHA [9x 37mm portee]

7th Armoured Brigade (Brigadier Hugh E. Russell)
1 RTR (Lieutenant Colonel George J. N. Culverwell) [10 cruiser, 8 light]
Support Group (Lieutenant Colonel William H. E. 'Strafer' Gott)
A Squadron, 11th Hussars [12 Rolls-Royce/CS9 armoured cars]
Support: 1st Battalion, KRRC, F/4 RHA [8 25-pdr]

31 MARCH 1941 MARSA EL BREGA

Axis

Commander in Chief North Africa (Superasi) Generale d'Armata Italo Gariboldi
Deutsches Afrika Korps (DAK) (Generalleutnant Erwin Rommel)
5. leichte-Division (Generalmajor Johannes Streich)
Aufklärungs-Abteilung 3 (Oberstleutnant Freiherr von Wechmar)
Panzer-Regiment 5 (Oberst Herbert Olbrich)
Stab [1 Pz III, 7 Pz II, 9 Pz I, 3 Pz Bef]
I./Panzer-Regiment 5 (Major Ernst Bolbrinker)[10 Pz IV, 35 Pz III, 19 Pz II, 7 Pz I, 2 Pz Bef]
II. Abteilung (Major Ewald Hohmann)[10 Pz IV, 35 Pz III, 19 Pz II, 9 Pz I, 2 Pz Bef]
Regimentsstab z.b.V. 200 (Oberstleutnant Gerhard Graf von Schwerin)
Maschinengewehr-Bataillon 2 (Major Heinrich Voigtsberger)
Maschinengewehr-Bataillon 8 (Oberstleutnant Gustav Ponath)[1]
Panzerjäger-Abteilung 605 (sfl.) (Major Rau) [27 Panzerjäger I]

132ª Divisione corazzata Ariete (Generale di Divisione Ettore Baldassarre)
VII Battaglione Carri Medi (Maggiore Alberto Andreani) [46 M13/40]
I Battaglione Carri Leggeri (Tenenti Colonnelli Andrea Rispoli) [CV-35]
II Battaglione Carri Leggeri (Tenenti Colonnelli Enrico Maretti) [CV-35]
III Battaglione Carri Leggeri (Maggiore Giuseppe Mangano) [CV-35]
8° Reggimento Bersaglieri (Colonnello Ugo Montemurro)
132º Reggimento artiglieria

Allies

Middle East Command (General Archibald Wavell)
Cyrenaica Command (Lieutenant General Sir Philip Neame)[2]
2nd Armoured Division (Major General Michael D. Gambier-Parry)[3]
3rd Armoured Brigade (Brigadier Reginald G. W. Rimington)[4]
3rd Hussars (Lieutenant Colonel George E. Younghusband)[5] 26 Mk VIb, 12 M13/40]
5 RTR (Lieutenant Colonel Henry D. Drew) [25 Mk IVA]

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[1] Killed in action, 13 April 1941
[2] Captured night 7/8 April 1941
[3] Captured
[4] Captured on 6 April and died of injuries 9 April 1941
[5] Captured 23 or 30 April 1941

6 RTR (Lieutenant Colonel Leonard S. Harland) [36 M13/40]
Support Group (Brigadier Henry B. Latham)[1]
1st Battalion/Tower Hamlets Rifles, **1er Batallion d'Infanterie de Marine** [Free French]
104 RHA [16 25-pdr], J Battery, 3 RHA [9 2-pdr, 3 37mm]
1st King's Dragoon Guards (KDG) (Lieutenant Colonel Donald McCorquodale)

15 MAY 1941 OPERATION *BREVITY*

Axis

Deutsches Afrika Korps (DAK) (Generalleutnant Erwin Rommel)
Kampfgruppe von Herff (Obest Maximilian von Herff)
Aufklärungs-Abteilung 3 (Oberstleutnant Freiherr von Wechmar)
Panzer-Abteilung Hohmann (Major Ewald Hohmann) [27 tanks]

Kampfgruppe Cramer (Oberstleutnant Hans Cramer)
I./Panzer-Regiment 8 (Major Crohn)

Kampfgrppe von Esebeck
One medium company from I./Panzer-Regiment 5
Allies
Middle East Command (General Archibald Wavell)
Western Desert Force (Lieutenant General Noel Beresford-Peirse)
22nd Guards Brigade Group (Brigadier Ian D. Erskine)
4 RTR (Lieutenant Colonel Walter O'Carroll) [26 Matilda II, 4 Mk VIb]

7th Armoured Brigade Group (Brigadier Hugh E. Russell)
2 RTR (Lieutenant Colonel R. F. E. Chute) [8 MK IVA, 7 A9, 21 A10]
6th Australian Cavalry [28 Mk VIb]
D Squadron, 3rd Hussars [15 Mk VIb]
11th Hussars (Lieutenant Colonel W. I. Leatham)

15 JUNE 1941 OPERATION *BATTLEAXE*

Axis

Commander in Chief North Africa (Superasi) Generale d'Armata Italo Gariboldi
Deutsches Afrika Korps (DAK) (Generalleutnant Erwin Rommel)
15. Panzer-Division (Generalmajor Walter Neumann-Silkow)
Panzer-Regiment 8 (Oberstleutnant Hans Cramer)[2]
I./Panzer-Regiment 8 (Major Crohn) [13 Pz II, 18 Pz III, 8 Pz IV]
II./Panzer-Regiment 8 (Oberstleutnant Ramsauer)
I./Schützen-Regiment 104 (Hauptman Wilhelm Bach)
Kradschützen-Bataillon 15 (Oberstleutnant Gustav-Georg Knabe)

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[1] Relieved of command on 8 April and replaced by Brigadier Gott

[2] Wounded in action, 16 June 1941, replaced by Oberstleutnant Ramsauer.

Aufklärungs-Abteilung 33
Support: Panzerjäger-Abteilung 33, I./Artillerie-Regiment 33 [10.5cm], I./Flak-Regiment 33 [8.8cm]

5. leichte-Division (Generalmajor Johann von Ravenstein)
    Panzer-Regiment 5 (Major Ernst Bolbrinker)[1]
    Aufklärungs-Abteilung 3 (Oberstleutnant Freiherr von Wechmar)
102ª Divisione Fanteria 'Trento' (Generale di Divisione Luigi Nuvoloni)

Allies

Middle East Command (General Archibald Wavell)
Western Desert Force (Lieutenant General Noel Beresford-Peirse)
4th Indian Division (Major General Frank W. Messervy)
    4th Armoured Brigade (Brigadier Alexander H. Gatehouse)
        4 RTR (Lieutenant Colonel Walter O'Carroll) [26 Matilda Mk II, 2 Mk IVA, 4 Mk VIc]
        7 RTR (Lieutenant Colonel Basil Groves) [48 Matilda Mk II, 6 Mk VIc]
        D Squadron, 3rd Hussars [16 Mk VIb]
        One infantry company, 2nd Battalion, Rifle Brigade
    22nd Guards Brigade Group (Brigadier Ian D. Erskine)
        Three infantry battalions, one anti-tank regiment
    11th Indian Brigade (Brigadier Reginald Savory)
        A Squadron, 4 RTR [6 Matilda Mk II]
        C Squadron, 4 RTR (Major Cecil G. Miles)[2] [12 Matilda Mk II]
        2nd Battalion Queen's Own Cameron Highlanders
        Two Indian infantry battalions, one motorized cavalry battalion
        25th Field Regiment, Royal Artillery [25-pdr]
    Artillery Group
        8th and 31st Field Regiments, Royal Artillery [25-pdr
        6th Field Regiment Royal Artillery [6-inch howitzers]
        212th Medium Battery Royal Artillery [6-inch howitzers]
        Prince Albert Victor's Own (motorized cavalry)

7th Armoured Division (Major General Michael O'Moore Creagh)
    7th Armoured Brigade Group (Brigadier Hugh E. Russell)[3]
        2 RTR (Lieutenant Colonel R. F. E. Chute) [21 Mk IVA, 10 A9, 11 A10]
        6 RTR (Lieutenant Colonel Leonard S. Harland)[4] [52 Crusader]
    11th Hussars (Lieutenant Colonel William I. Leetham)
    Support Group (Brigadier William H. E. 'Strafer' Gott)
        1st Battalion KRRC
        2nd Battalion RB)
        4th Royal Horse Artillery (RHA) [25-pdr]
        4th Field Squadron Royal Engineers

[1] Wounded in action, 16 June 1941.
[2] Killed in action 15 June 1941.
[3] Died in air crash 5 October 1941.
[4] Harland relieved of command and replaced by Lieutenant Colonel M. D. B. Lister.

18 NOVEMBER 1941 OPERATION *CRUSADER*

Axis

- Commander in Chief North Africa (Superasi) Generale Ettore Bastico
- Panzergruppe Afrika (General der Panzertruppe Erwin Rommel)
- Deutsches Afrika Korps (DAK) (Generalleutnant Ludwig Crüwell)
- 15. Panzer-Division (Generalmajor Walter Neumann-Silkow)[1]
    - Kampfgruppe Cramer
        - Panzer-Regiment 8 (Oberstleutnant Hans Cramer)
            - I./Panzer-Regiment 8 (Major Günther Fenski)[2]
            - II./Panzer-Regiment 8 (Hauptmann Wolfgang Wahl)
            - Total strength: 42 Pz II, 77 Pz III, 21 Pz IV, 10 Pz Bef, 5 Matilda Mk II)
        - Support: I./Artillerie-Regiment 33 [8 10.5cm]
    - Kampfgruppe Menny (Oberst Erwin Menny)
        - Schützen-Regiment 115 (2 infantry battalions)[3]
        - Support: one motorized engineer battalion, Panzerjäger-Abteilung 33 [18 5cm Pak 38], II./ Artillerie-Regiment 33 [x 10.5cm]
    - Kampfruppe Geissler (Oberstleutnant Erich Geissler)
        - Kradschützen-Bataillon 15
        - Maschinengewehr-Bataillon 2
        - III./Artillerie-Regiment 33 [8 10.5cm]
        - Support: Artillerie-Regiment 33 [4 10cm sK18, 8 15cm sFH], 3./Flak-Regiment 33 [4 8.8cm]

- 21. Panzer-Division (Generalmajor Johann von Ravenstein)[4]
    - Kampfgruppe Stephan
        - Panzer-Regiment 5 (Oberstleutnant Friedrich Stephan)[5]
            - I./Panzer-Regiment 5 (Major Werner Mildebrath)
            - II./Panzer-Regiment 5 (Major Friedrichs)
            - Total strength: 35 Pz II, 68 Pz III, 17 Pz IV, 4 Pz Bef)
    - Schützen-Regiment 104 (3 infantry battalions)
    - Support: Panzerjäger-Abteilung 39 [15 5cm Pak 38], 1 motorized engineer battalion, Artillerie-Regiment 155 [36 10.5cm l.FH18, 4 10cm sK18, 8 15cm sFH], 3./Flak-Regiment 18 [4 8.8cm
    - Aufklärungs Gruppe Wechmar (Oberstleutnant Freiherr von Wechmar)
        - Aufklärungs-Abteilung (mot.) 3
        - Aufklärungs-Abteilung (mot.) 33
        - 2./Flak-Regiment 18 [4 8.8cm]

- Divisionskommando z.b.V. Afrika (Generalmajor Max Sümmermann)[6]

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[1] Died of wounds 9 December 1941.

[2] Killed in action 23 November 1941, replaced by Hauptmann Johannes Kümmel.

[3] One company, 2./S.R. 115, mounted in SdKfz 251/1 halftracks under Major Grolman.

[4] Captured 29 November 1941.

[5] Killed in action 25 November 1941, replaced by Major Werner Mildebrath.

[6] Re-designated 90. leichten Afrika-Division on 26 November 1941.

  Panzerjäger-Abteilung 605 (sfl.) [27 Panzerjäger I]
  Support: 7 infantry battalions

55ª Divisione Fanteria 'Savona' (Generale di Divisione Fedele de Giorgis)
  Light tank company, IV Battaglione Carri Leggeri
  Infantry support: six infantry battalions, two batteries of FlaK [8 8.8cm]

Corps troops:
  1.,2./Flak-Regiment 33 (Hauptmann Fromm) [8 8.8cm]
  1./Flak-Regiment 18 [4 8.8cm]
  Gruppe Böttcher (Generalmajor Karl Böttcher) [Arko 104]: Five artillery battalions [9 21cm, 38 15cm, 12 10.5cm]

Italian Corpo d'Armata di Manovra (CAM) (Generale di Corpo d'Armata Gastone Gambara)
132ª Divisione Corazzata 'Ariete' (Generale di Divisione Mario Balotta)
  132º Reggimento Carri (Tenente Colonnello Enrico Maretti)
    VII Battaglione Carri Medi (Capitano Simone Urso)[1] [50 M13/40]
    VIII Battaglione Carri Medi (Capitano Corrado Casale de Bustis y Figaroa) [50 M13/40]
    IX Battaglione Carri Medi [50 M13/40]
  8° Reggimento Bersaglieri (Colonnello Ugo Montemurro) [2 infantry battalions, one support weapons battalion]
  Support: 132º Reggimento Artiglieria [24 75/27, 10x 105/28], III Gruppo Milizia Artiglieria Marittima (MILMART) [2 batteries with a total of 7 102/35 truck-mounted guns], one motorized engineer battalion

101ª Divisione Motorizzate 'Trieste' (Generale di Divisione Alessandro Piazzoni)
  Infantry support: 6 motorized battalions
  Artillery support: 20 75/27, 12 100/17, 12 105/28
  Engineer support: 1 motorized battalion

Corps Assets:
Ragruppamento Esplorante del Corpo d'Armata di Manovra (RECAM) (Colonnello De Meo)
  III Battaglione Carri Leggeri 32º [CV-35]
  One company/LII Battaglione Carri Leggeri [9 M13/40]
  Battaglione Polizia Africa Italiana (PAI) [10 AB40 armoured cars]
  Compagnia Sperimentale del 'Nizza Cavalleria' [4 L6/40 and some AB 41 armoured cars]
  Support: two infantry battalions
9° Reggimento Bersaglieri
Italian XXI Corpo d'Armata
102ª Divisione Motorizzate 'Trento'
  Three infantry divisions: 'Pavia', 'Bologna', 'Brescia'

Allied

Middle East Command (General Claude Auchinleck)

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[1] Killed in action 30 November 1941.

8th Army (Lieutenant General Sir Alan Cunningham)
XIII Corps (Lieutenant General Alfred Godwin-Austen)
4th Indian Division

2nd New Zealand Division (Major General Bernard Freyberg)
1st Army Tank Brigade (Brigadier Harry R. B. Watkins)
8 RTR (Lieutenant Colonel F. K. Brooke) [52 Valentine, 6 Matilda CS]
42 RTR (Lieutenant Colonel Aleck R. Martin) [33 Matilda, 6 Mk VIc][1]
44 RTR (Lieutenant Colonel Herbert C. J. Yeo) [50 Matilda, 7 Mk VIc]
Support: 8th Field Regiment RA [16 25-pdr]

XXX Corps (Lieutenant General Charles W. Norrie)
7th Armoured Division (Major General William H. E. 'Strafer' Gott)
Division Headquarters [15 cruiser, 2 Crusader]
4th Armoured Brigade (Brigadier Alexander H. Gatehouse)
Brigade HQ: [10 Stuart]
8th Hussars (Lieutenant Colonel Dick S. Cripps)[2] [52 Stuart]
3 RTR (Lieutenant Colonel A. A. H. Ewin) [52 Stuart]
5 RTR (Lieutenant Colonel Henry D. Drew) [52 Stuart]
4th South African Armoured Car Regiment (Lieutenant Colonel Dennis S. Newton-King) [52 Marmon-Herrington armoured cars]
Support: 2nd Battalion, Scots Guards (one company attached to each tank regiment); L, N/2 RHA (two batteries of 8 25-pounder each); 102nd Anti-tank Regiment [two batteries of 12 2-pdr mounted portee each]
7th Armoured Brigade (Brigadier George M. Davy)
Brigade HQ: [5 A10, 5 A9CS]
7th Hussars (Lieutenant Colonel Frederick W. Byass)[3] [21 A10, 16 Mk IVA, 20 Crusader]
2 RTR (Lieutenant Colonel Rowland F. E. Chute) [52 Mk IVA]
6 RTR (Lieutenant Colonel M. D. B. Lister)[4] [49 Crusader]
A, B/KDG [40 Marmon-Herrington armoured cars]
Support: A Company, 2nd Battalion, Rifle Brigade, Battery 4 RHA [8 25-pounders], 3rd Troop 102nd Anti-tank Regiment [4 2-pdr portee]
22nd Armoured Brigade (Brigadier John Scott-Cockburn)[5]
2nd Royal Gloucestershire Hussars (Lieutenant Colonel Normand A. Birley)[6] [52 Crusader]
3 CLY (Lieutenant Colonel R. K. Jago) [48 Crusader, 4 CS A9/A10]
4 CLY (Lieutenant Colonel William G. Carr) [48 Crusader]
11th Hussars (Lieutenant Colonel William I. Leetham) [Humber]
Support: B Company, 1st Battalion KRRC, C Battery, 4 RHA [8 25-pdr], 2nd Troop, 102nd

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[1] C Squadron 42 RTR joined the regiment on 25 November, adding 16 more Matilda and 2 Mk VI.
[2] Captured 22 November 1941.
[3] Killed in action 21 November 1941.
[4] Captured 21 November 1941.
[5] Relieved of command, 20 November, replaced by Lieutenant Colonel Carr.
[6] Wounded in action, 19 November 1941, temporarily replaced by Major William A. B. Trevor. Both Birley and Trevor were killed in the Cauldron fighting on 6 June 1942.

Anti-Tank Regiment [4 2-pdr], M Battery, 3 RHA [12 2-pdr]
7th Support Group (Brigadier John C. ‘Jock’ Campbell)
Support: 1st Battalion KRRC, 2nd Battalion RB; D, J/3 RHA (AT); 2 RHA, 4 RHA [each 12 25-pdr], 60th Field Regiment [24 25-pdr]

Corps Troops:
6th South African Armoured Car Regiment

1st South African Division (Major General George E. Brink)
22nd Guards Brigade

Tobruk Garrison (Major General Ronald Scobie)
70th Infantry Division1st Polish Carpathian Brigade
32nd Army Tank Brigade (Brigadier Arthur C. Willison)
1 RTR (Lieutenant Colonel Frank Brown) [28 mixed cruisers, 21 Mk VI]
4 RTR (Lieutenant Colonel Walter O’Carroll) [51 Matilda II, 6 Mk VI]
D Squadron, 7 RTR (Major John R. Holden) [17 Matilda II, 2x Mk VI]
C Squadron, 1st KDRG [29 Marmon-Harrington armoured cars]

BIBLIOGRAPHY

PRIMARY SOURCES

Ia, Kriegstagebuch, 6 February 1941–22 November 1942, Deutsches Afrika Korps, NAM (National Archives Microfilm), Series T-314, Rolls 1, 2, 9, 10, 21.

Ia, Kriegstagebuch, 15 August–18 November 1941, Panzerarmee Afrika, NAM (National Archives Microfilm), eries T-313, Rolls 423.

Ia, Schlachtbericht der Pz.-Armee Afrika mit Karten, 18 November 1941–6 February 1942, Panzerarmee Afrika, NAM (National Archives Microfilm), eries T-313, Roll 430.

Ia, Schlachtbericht über die Kämpfe der Pz.-Armee Afrika, 26 May–27 July 1942, Panzerarmee Afrika, NAM (National Archives Microfilm), Series T-313, Roll 469.

Ia, Schlachtbericht über die Kämpfe der Pz.-Armee Afrika, 23–31 October 1942 and 1 November 1942–23 February 1943, Panzerarmee Afrika, NAM (National Archives Microfilm), eries T-313, Rolls 470–471.

MTP No. 22, Tactical Handling of Army Tank Battalions, Part III (War Office, eptember 1939), Section 5, 6, 8, 9.

ATI No. 2, The Employment of Army Tanks in Co-operation with Infantry (War Office, arch 1941), paragraph 5.

Diary of Oberstleutnant Gustav Ponath, M.G. Btl. 8, 27 February–14 April 1941, translated in Appendix A, Intelligence Summary No. 40, General Staff Branch, 9th Australian Division, 17 May 1941, AWM52 1/5/20/8.

Diary of Leutnant Joachim Schorm, II./Pz. Regt. 5, 29 April–14 May 1941, translated in Appendix A, Intelligence summaries No. 72 and No. 73, General Staff Branch, 9th Australian Division, 26 and 27 June 1941, AWM52 1/5/20/10.

Various Australian unit war diaries found in the Australian War Memorial (AWM) AWM52 collection. www.awm.gov.au/collection/C1359733

Memoirs

Close, Bill, *Tank Commander: From the Fall of France to the Defeat of Germany* (Barnsley: Pen & Sword Books Ltd, 2013).

Crisp, Robert, *Brazen Chariots* (New York: W. W. Norton & Company, 1959).

Douglas, Keith, *Alamein To Zem Zem* (London: Bantam Books, 1985).

Gardiner, Henry E., *1271 Days a Soldier: The Diaries and Letters of Colonel*

H.E. Gardiner as an Armored Officer in World War II (Dahlonega: University of North Georgia Press, 2021).

Hamilton, Stuart, *Armoured Odyssey: 8th Royal Tank Regiment in the Western Desert, 1941–42, Palestine, Syria, Egypt, 1943–44, Italy, 1944–45* (London: Tom Donovan, 1995).

von Mellenthin, Friederich, *Panzer Battles: A Study of the Employment of Armour in the Second World War* (New York: Ballantine Books, 1971).

Roberts, Philip, *From the Desert to the Baltic* (London: William Kimber & Co. Ltd., 1987).

Robinett, Paul M., *Armor Command: The Personal Story of a Commander of the 13th Armored Regiment: of CCB, 1st Armored Division, and of the Armored School during World War II* (Washington: McGregor & Werner, 1958).

Vaglia, Italo, *Da Tobruk ad El Alamein: col IX Btg. dell' 'Ariete'* [From Tobruk to El Alamein with the IX Battalion of 'Ariete'] (Brescia: Stamperia Fratelli Geroldi, 1994).

SECONDARY SOURCES

Aberger, Heinz-Dietrich, *Die 5.(lei.)/21.Panzer-Division in Nordafrika 1941–1943* (Reutlingen: Preussischer Militär-Verlag, 1994).

Barclay, Cyril N., *History of the 16th/5th The Queen's Royal Lancers, 1925 to 1961* (Aldershot: Gale and Polden, 1963).

Barnett, Correlli, *The Desert Generals* (London: Cassel & Co., 1983).

Barr, Niall, *Pendulum of War: The Three Battles of El Alamein* (Woodstock, NY: The Overlook Press, 2004).

Battistelli, Pier Paolo, *Rommel's Afrika Korps: Tobruk to El Alamein* (Oxford: Osprey Publishing, 2006).

Beale, Peter, *Death by Design: British Tank Development in the Second World War* (Stroud: The History Press, 1998).

Bierman, John, and Colin Smith, *War Without Hate: The Desert Campaign of 1940–1943* (New York: Penguin Books, 2004).

Bond, Brian, *British Military Policy Between the Two World Wars* (Oxford: Oxford University Press, 1980).

Boog, Horst, et al., *Germany and the Second World War: Volume VI: The Global War* (Oxford: Oxford University Press, 2015).

Burdick, Charles B., *Unternehmen Sonnenblume: Der Entschluss zum Afrika-Feldzug, Die Wehrmacht inm Kampf Vol. 48* (Neckargemund: Kurt Vowinckel, 1972).

Büschleb, Hermann, *Operation* Crusader*: Tank Warfare in the Desert, Tobruk 1941* (Philadelphia: Casemate Publishers, 2019).

Cameron, Robert S., *Mobility, Shock and Firepower: The Emergence of the U.S. Army's Armor Branch, 1917–1945* (Washington, DC: Center of Military History, US Army, 2008).

Cappellano, Filippo, and Pier Paolo Battistelli, *Italian Light Tanks 1919–1945* (Oxford: Osprey Publishing, 2012).

Cappellano, Filippo, and Pier Paolo Battistelli, *Italian Medium Tanks 1939–1945* (Oxford: Osprey Publishing, 2012).

Carver, Michael, *El Alamein* (Ware: Wordsworth Editions Ltd, 2007).

Citino, Robert M., *The Path to Blitzkrieg: Doctrine and Training in the German Army, 1920–39* (Mechanicsburg: Stackpole Books, 1999).

Clarke, Dudley, *The Eleventh at War: Being the Story of the XIth Hussars (Prince Albert's Own) Through the Years 1934–1945* (London: Michael Joseph, 1952).

Coombs, Benjamin, *British Tank Production and the War Economy, 1934-1945* (London: Bloomsbury Publishing, 2013).

Corum, James S., *The Roots of Blitzkrieg: Hans von Seeckt and German Military Reform* (Lawrence: University Press of Kansas, 1992).

Creveld, Martin van, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge: Cambridge University Press, 1977).

Dando, Neal, *From Tobruk to Tunis: The Impact of Terrain on British Operations and Doctrine in North Africa, 1940–1943* (Solihull: Helion and Company, 2016).

Davy, George M. O., *The Seventh and Three Enemies: The Story of World War II and the 7th Queen's Own Hussars* (Uckfield: The Naval & Military Press, Ltd., 2014).

Doherty, Richard, *British Armoured Divisions and their Commanders, 1939–1945* (Barnsley, UK: Pen & Sword, 2013).

von Esebeck, Hanns-Gert, *Das Deutsche Afrika-Korps: Sieg und Niederlage* (Wiesbaden: Limes-Verlag, 1975).

Fletcher, David, *British Battle Tanks: British-Made Tanks of World War II* (Oxford: Osprey Publishing Ltd., 2017).

Fletcher, David, *The Great Tank Scandal: British Armour in the Second World War, Part 1* (London: HMSO, 1999).

Forty, George (ed.), *Jake Wardrop's Diary: A Tank Regiment Sergeant's Story* (Stroud: Amberley Publishing, 2009).

Forty, George, *The First Victory: O'Connor's Desert Triumph* (Tunbridge Wells: The Nutshell Publishing Co. Ltd, 1990).

French, David, 'Doctrine and Organization in the British Army, 1919–1932', *The Historical Journal*, Vol. 44, No. 2 (June 2001), pp. 497–515.

Friedli, Lukas, *Repairing the Panzers: German Tank Maintenance in World War 2, Volume 2* (Monroe, NY: Panzerwrecks, 2011).

Gooch, John, *Mussolini's War: Fascist Italy from Triumph to Collapse, 1935–1943* (New York: Pegasus Books, 2020).

Habeck, Mary R., *Storm of Steel: The Development of Armor Doctrine in Germany and the Soviet Union, 1919–1939* (Ithaca: Cornell University

Press, 2003).

Harris, J. P., *Men, Ideas, and Tanks: British Military Thought and Armoured Forces, 1903–1939* (Manchester: Manchester University Press, 1995).

Hartmann, Bernd, *Panzers in the Sand: The History of Panzer-Regiment 5, 1935–41*, Volume 1 (Mechanicsburg, PA: Stackpole Books, 2010).

Hartmann, Bernd, *Panzers in the Sand: The History of Panzer-Regiment 5, 1942–45*, Volume 2 (Mechanicsburg, PA: Stackpole Books, 2011).

Howe, George F., *North-west Africa: Seizing the Initiative in the West*, United States Army in World War II, Mediterranean Theater of Operations (Washington: Department of the Army, 1957).

Hunnicutt, Richard P., *Sherman: A History of the American Medium Tank* (Novato, CA: Presidio Press, 1976).

Jentz, Thomas L., *Panzertruppen*, Volume 1 (Atglen, PA: Schiffer Military History, 1996).

Jentz, Thomas L., *Tank Combat in North Africa: The Opening Rounds* (Atglen, PA: Schiffer Military History, 1998).

Knight, P. M., *A13 Mk. I & Mk. II Cruiser Tanks: A Technical History* (Columbia, SC: Black Prince Publications, 2019).

Knight, P. M., *A15 Cruiser Mk. VI Crusader Tank: A Technical History* (Columbia, SC: Black Prince Publications, 2015).

Larson, Robert H., *The British Army and the Theory of Armored Warfare 1918-1940* (Newark: University of Delaware Press, 1984).

Liddell Hart, Basil, *The Tanks: The History of the Royal Tank Regiment, Volume II* (London: Cassell & Co Ltd, 1959).

Lucas Phillips, C. E., *Alamein* (London: Heinemann, 1962).

Macksey, Kenneth, *Beda Fomm: The Classic Victory* (New York: Ballantine Books, 1971).

Montanari, Mario, *Le operazioni in Africa Settentrionale. Vol. I – Sidi el Barrani (Giugno 1940–Febbraio 1941)* (Rome: Stato maggiore dell'esercito, ufficio storico, 1990)

Montanari, Mario, *Le operazioni in Africa Settentrionale. Vol. II – Tobruk (Marzo 1941–Gennaio 1942)* (Rome: Stato maggiore dell'esercito, ufficio storico, 1993)

Montanari, Mario, *Le operazioni in Africa Settentrionale. Vol. III – El Alamein (Gennaio–Novembre 1942)* (Rome: Stato maggiore dell'esercito, ufficio storico, 1989)

Montanarino, Mario, *Le operazioni in Africa Settentrionale. Vol. IV– Enfidaville (Novembre 1942–Maggio 1943)* (Rome: Stato maggiore dell'esercito, ufficio storico, 1993)

Nehring, Walther K., *Die Geschichte der deutschen Panzerwaffe 1916–1945* (Stuttgart: Motorbuch Verlag, 2019).

Orpen, Neil, *War in the Desert, South African Forces in World War II*, Vol. III (Capetown: Purnell, 1971).

Parri, Maurizio, *Storia dei Carristi e del 32° reggimento carri* [History of the Tankers of the 32nd Tank Regiment].

Pignato, Nicola, and Filippo Cappellano, *Gli autoveicoli da combattimento dell'esercito italiano, Volume 1: Dalle origini fino al 1939* [The Combat Vehicles of the Italian Army, Volume 1: From its Origins to 1939] (Rome: Stato maggiore dell'esercito, ufficio storico, 2002).

Pignato, Nicola, and Filippo Cappellano, *Gli autoveicoli da combattimento dell'esercito italiano, Volume 2: 1940–1945* [The Combat Vehicles of the Italian Army, Volume 2: 1940–1945] (Rome: Stato maggiore dell'esercito, ufficio storico, 2002).

Pitman, Stuart, *Second Royal Gloucestershire Hussars Libya–Egypt–1942* (Uckfield: Naval & Military Press, 2014).

Pitt, Barrie, *Auchinleck's Command: The Crucible of War Book 2* (Sharpe Books Ltd, 2019).

Pitt, Barrie, *Montgomery and Alamein: The Crucible of War Book 3* (Sharpe Books Ltd, 2020).

Pitt, Barrie, *Wavell's Command: The Crucible of War Book 1* (Sharpe Books Ltd, 2019).

Place, Timothy Harrison, *Military Training in the British Army, 1940–1944* (London: Routledge, 2000).

Playfair, Ian S. O., *The Mediterranean and Middle East Volume I: The Early Successes Against Italy* (Uckfield: The Naval & Military Press, 2004).

Playfair, Ian S. O., *The Mediterranean and Middle East Volume II: The Germans Come to the Help of their Ally* (Uckfield: The Naval & Military Press, 2004).

Playfair, Ian S. O., *The Mediterranean and Middle East Volume III: British Fortunes Reach Their Lowest Ebb* (Uckfield: The Naval & Military Press, 2004).

Playfair, Ian S. O., *The Mediterranean and Middle East Volume IV: The Destruction of the Axis Forces in Africa* (Uckfield: The Naval & Military Press, 2004).

Rebora, Andrea, *Carri 'Ariete' combattono: Le vicende della divisione corazzata 'Ariete' nelle lettere del tenente Pietro Ostellino, Africa settentrionale 1941-1943* (Rome: Prospettivaeditrice, 2016).

Robins, Colin, 'Orders of Battle of British Tank Forces, and Tank Types at Key Dates in the Western Desert, 1940–42', *Journal of the Society for Army Historical Research*, Vol. 93, No. 373 (Spring 2015), pp. 48–59.

Schneider, Wolfgang, *Panzer Tactics: German Small-Unit Armor Tactics in World War II* (Mechanicsburg, PA: Stackpole Books, 2005).

Schreiber, Gerhard, et. al., *Germany and the Second World War, Vol. III, The Mediterranean, South-East Europe, and North Africa, 1939–1941* (Oxford: Oxford University Press, 2015).

Shannon, Kevin, *Death or Glory: The 17th/21st Lancers 1922–1993*

(Stroud: Fonthill Media, 2021)

Sweet, John Joseph Timothy, *Iron Arm: The Mechanization of Mussolini's Army, 1920–40* (Mechanicsburg: Stackpole Books, 2006).

Taysen, Adalbert von, *Tobruk 1941: Der Kampf in Nordafrika* (Freiburg: Rombach, 1976).

Toppe, Alfred, *Desert Warfare: The German Experience in World War II* (Fort Leavenworth, KS: Combat Studies Institute, 1991).

Trye, Rex, *Mussolini's Afrika Korps: The Italian Army in North Africa, 1940-1943* (Bayside, NY: Axis Europa Books, 1999).

Urban, Mark, *The Tank War* (London: Abacus, 2014).

Walker, Ian, *Iron Hulls Iron Hearts: Mussolini's Elite Armoured Divisions in North Africa* (Ramsbury: The rowood Press, 2006).

Winton, Harold R., *To Change an Army: General Sir Jock Burnett-Stuart and British Armoured Doctrine, 1927–1938* (Lawrence: University Press of Kansas, 1988).

NOTES

PREFACE

1 Ian S. O. Playfair, *Mediterranean and Middle East Volume II: The Germans Come to the Help of their Ally 1941* (Uckfield: The Naval & Military Press, Ltd., 2009), p. 29.

INTRODUCTION

1 Albert A. Nofi, 'The Afrika Korps', *Strategy & Tactics*, No. 23 (October 1970), p. 8.
2 Alfred Toppe, *Desert Warfare: The German Experience in World War II* (Fort Leavenworth, KS: Combat Studies Institute, 1991), p. 76.
3 Daniel Allen Butler, *Field Marshal: The Life and Death of Erwin Rommel* (Philadelphia: Casemate Publishers, 2015), pp. 289–90, 357, 372.
4 H. S. Gear, 'Hygiene Aspects of The El Alamein Victory, 1942', *The British Medical Journal*, Vol. 1, No. 4341 (1944), pp. 383–87.

CHAPTER 1

1 Bryan Cooper, *The Ironclads of Cambrai: The First Great Tank Battle* (Reading: Cassell, 1967), pp. 90–92.
2 Carlo D'Este, *Patton: A Genius for War* (New York: Harper Collins, 1995), pp. 231–35.
3 J. F. C. Fuller, 'The Tactics of the Attack as Affected by the Speed and Circuit of the Medium "D" Tank', June 1918, FP I/208/TS/50.
4 Brian Holden Reid, *J.F.C Fuller: Military Thinke* (New York: St Martin's Press, 1987), pp. 48–54.
5 David French, 'Doctrine and Organization in the British Army, 1919–1932', *The Historical Journal*, Vol. 44, No. 2 (June 2001), p. 499.
6 In October 1923, the Tank Corps was re-designated as the Royal Tank Corps (RTC). Although the term 'Royal Tank Regiment' or RTR was not in use until 1939, it is employed here to avoid confusion.
7 Andre Duvignac, *Histoire de l'armée motorisée* (Paris: Imprimerie Nationale, 1948), p. 349.
8 French, 'Doctrine and Organization', pp. 505–07.
9 *Field Service Regulations, Volume II, Operations* (London: His Majesty's Stationery Office, 1924) p. 12.
10 Army Estimates, 1923–24, House of Commons Debate, 15 March 1923, vol. 161, cc1829–75.
11 The Mk I was originally designated as a light tank; 28 were built by Vickers Ltd and 30 by the Royal Ordnance Factory at Woolwich. Several versions of the Mk II tank were built, including 71 by Woolwich and 41 by Vickers. The unit price of the Mk I tanks built at Woolwich was £6,190 and those at Vickers were £8,190 each.
12 Philip Ventham and David Fletcher, *Moving the Guns: The Mechanization of the Royal Artillery, 1854– 1939* (London: HMSO, 1990), p. 29.
13 J. F. C. Fuller, *The Reformation of War* (London: Hutchinson & Co., 1923).
14 Fuller, *Reformation of War*, pp. 163–64.
15 Hart's writing on mechanization prior to the creation of the EMF included 'The Development of the New Model Army', *The Army Quarterly*, Vol. IX, (1924), pp. 37–50, in which he recommended the creation of a mobile division with three tank brigades and attached artillery and infantry.
16 John J. Mearsheimer, *Liddell Hart and the Weight of History* (Ithaca: Cornell University Press, 1988), pp. 34–35, 206–07.
17 Robert H. Larson, *The British Army and the Theory of Armored Warfare 1918–1940* (Newark: University of Delaware Press, 1984), pp. 124–25.
18 Peter Beale, *Death by Design: British Tank Development in the Second World War* (Stroud: The History Press, 1998), pp. 23–25.
19 Mearsheimer, *Weight of History*, pp. 73–77.

20 Reid, *Military Thinker*, p. 151.

21 IWM Sound Archive, accession no. 000858/05, Major General F. W. Gordon Hall, pp. 16–17.

22 Harold E. Raugh Jr, *Wavell in the Middle East, 1939–1941: A Study in Generalship* (Norman: University of Oklahoma Press, 2013), pp. 23–24.

23 Greg Baughen, *The Rise of the Bomber: RAF-Army Planning 1919 to Munich 1938* (Stroud: Fonthill, 2016), pp. 80–81.

24 Kenneth Macksey, *A History of the Royal Armoured Corps and its Predecessors, 1914–1975* (Beaminster: Newtown Publications, 1983), p.52.

25 David French, ‘The Mechanization of the British Cavalry between the World Wars’, *War in History*, Vol. 10, No. 3 (July 2003), p. 310.

26 Larson, *British Army*, pp. 93.

27 J. P. Harris, *Men, Ideas, and Tanks: British Military Thought and Armoured Forces, 1903–1939* (Manchester, Manchester University Press, 1995), p. 240.

28 N. S. Nash, *‘Strafer’ – The Life and Times of Lieutenant General W. E. Gott* (Barnsley: Pen & Sword, 2013), pp. 95–96.

29 Basil Liddell Hart, *The Tanks: The History of the Royal Tank Regiment, Volume I* (London: Cassell & Co. Ltd, 1959), p. 227.

30 Paddy Griffith *Battle Tactics of the Western Front: The British Army's Art of Attack 1916–18* (New Haven: Yale University Press, 1994), p. 100.

31 Mearsheimer, *Weight of History*, pp. 5–8.

32 Brian Bond and Martin Alexander, ‘Liddell Hart and De Gaulle: The Doctrines of Limited Liability and Mobile Defense’, in *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, edited by Peter Paret et al. (Princeton: Princeton University Press, 2010), p. 606.

33 Piers Brendon, *The Dark Valley: A Panorama of the 1930s* (New York: Vintage Books, 2002), pp. 183–91.

34 Marlies Ter Borg, ‘Reducing Offensive Capabilities – The Attempt of 1932’, *Journal of Peace Research* Vol. 29, No. 2 (1992), pp. 149, 155.

35 Keith Neilson, ‘The Defence Requirements Sub-Committee, British Strategic Foreign Policy, Neville Chamberlain and the Path to Appeasement’, *The English Historical Review*, Vol. 118, No. 477 (2003), pp. 651–84.

36 John Keegan (ed.), *Churchill's Generals* (New York: Grove Weidenfeld, 1991), p. 235.

37 TNA War Office 32/2847 Army Organization: Cavalry (Code 14(D)): The Formation of a Mobile Division Minute 1, 15 October 1934.

38 David Fletcher, *British Battle Tanks: British-Made Tanks of World War II* (Oxford: Osprey Publishing Ltd, 2017), pp. 46–55.

39 Bond and Alexander, ‘Liddell Hart and De Gaulle’, p. 609.

40 Martin S. Alexander, *The Republic in Danger: General Maurice Gamelin and the Politics of French Defence, 1933–1940* (Cambridge: Cambridge University Press, 1992), p. 266.

41 Brendon, *Dark Valley*, pp. 175–76.

42 Benjamin Coombs, *British Tank Production and the War Economy, 1934–1945* (London: Bloomsbury Publishing, 2013), p. 23. See also Michael M. Postan, *British War Production, History of the Second World War* (London: HMSO, 1952), p. 195 fn.

43 French, ‘Mechanization of the British Cavalry’, pp. 313–14.

44 Steven Morewood, *The British Defence of Egypt, 1935–40: Conflict and Crisis in the Eastern Mediterranean* (New York: Frank Cass, 2005), pp. 53, 68–69.

45 Ronald Lewin, *Man of Armour: A Study of Lieutenant-General Vyvyan Pope and the Development of Armoured Warfare* (London: Leo Cooper Ltd, 1976), p. 86.

46 War Office Memorandum No. 57, (T.I.S.C.), 10 November 1936, WO/32/4441.

47 Irving M. Gibson, ‘Maginot and Liddell Hart: The Doctrine of Defense’, in *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, edited by Edward M. Earle (Princeton: Princeton University Press, 1971), p. 381.

48 Brian Bond, *British Military Policy Between the Two World Wars* (Oxford: Oxford University

Press, 1980), pp. 176–77. See also G. C. Peden, ‘The Burden of Imperial Defence and the Continental Commitment Reconsidered’, *The Historical Journal*, Vol. 27, No. 2 (1984), pp. 405–23.

49 George Forty (ed.), *Jake Wardrop's Diary: A Tank Regiment Sergeant's Story* (Stroud: Amberley Publishing, 2009), pp. 17–18.

50 Harris, *Men, Ideas, and Tanks*, p. 303.

51 P. M. Knight, *A13 Mk. I & Mk. II Cruiser Tanks: A Technical History* (Columbia, SC: Black Prince Publications, 2019), p. 170.

52 Fletcher, *British Battle Tanks*, pp. 109, 112.

53 Guy Chapman, *Why France Fell: The Defeat of the French Army in 1940* (New York: Holt, Rinehart and Winston, 1968), p. 69.

54 Knight, *Technical History*, pp. 173–74.

55 TNA AIR 9/137, Army Co-operation, Air Attack in Direct Support of the Field Force, 1939.

56 Heinz Guderian, *Panzer Leader* (New York: Ballantine Books, 1957), p. 14.

57 James S. Corum, *The Boots of Blitzkrieg: Hans von Seeckt and German Military Reform* (Lawrence: University Press of Kansas, 1992), pp. 111–12.

58 William Manchester, *The rms of Krupp: The Rise and Fall of the Industrial Dynasty That rmed Germany at War* (Boston: Little, Brown and Company, 2017), pp. 323–25.

59 Corum, *Roots of Blitzkrieg*, pp. 31, 49–50.

60 Mary R. Habeck, *Storm of Steel: The evelopment of Armor Doctrine in Germany and the Soviet Union, 1919-1939* (Ithaca: Cornell University Press, 2003), p. 65.

61 Fritz Heigl, *Taschenbuch der Tanks, Erganzungband 1927* (Munich: Lehmanns, 1927), pp. 142–44.

62 B. H. Liddell Hart (ed.), *The ommel Papers* (Boston: Da Capo Press, 1982), p. 203.

63 Habeck, *Storm of Steel*, pp. 49–50, 59–60.

64 Corum, *Roots of Blitzkrieg*, p. 130.

65 Manfred Zeidler, *Reichswehr und Rote Armee 1920–1933: Wege und Stationen einer ungewöhnlichen Zusammenarbeit* (Munich: R. Oldenbourg, 1993), p. 207.

66 Thomas L. entz, *Panzertruppen*, Volume 1 (Atglen, PA: Schiffer Military History, 1996), pp. 8–9.

67 Habeck, *Storm of Steel*, p. 73.

68 Ibid., p. 148.

69 Robert M. Citino, *The Path to Blitzkrieg: Doctrine and Training in the German Army, 1920–39* (Mechanicsburg: Stackpole Books, 1999), p. 217.

70 Bernd Hartmann, *Panzers in the Sand: The History of Panzer-Regiment 5, 1935–41*, Volume 1 (Mechanicsburg, PA: Stackpole Books, 2010), pp. 8–9.

71 Adam Tooze, *The Wages of Destruction: The Making and Breaking of the Nazi Economy* (New York: Penguin Books, 2006), pp. 53–54.

72 Walter Nehring, *Die Geschichte der Deutschen Panzerwaffe 1916 bis 194* (Stuttgart: Motorbuch Verlag, 2019), pp. 80–82.

73 Guderian, *Panzer Leader*, p. 19.

74 Habeck, *Storm of Steel*, pp. 210–11.

75 Jentz, *Panzertruppen*, pp. 24–27.

76 Hart, *The Tanks*, pp. 12–16.

77 Robert S. Cameron, *Mobility, Shock and Firepower: The mergence of the U.S. Army's Armor Branch, 1917–1945* (Washington, DC: Center of Military History, US Army, 2008), p. 343.

78 Steven J. Zaloga, *Early U.S. Armor: Tanks 1916–40* (Oxford: Osprey Publishing Ltd, 2017), pp. 12–13.

79 Martin Blumenson, *The atton Papers, Volume I, 1885-1940* (Boston: Houghton Mifflin ., 1972), p. 860.

80 Harold R. Winton, *To Change An Army: General Sir Jock Burnett-Stuart and British Armoured Doctrine, 1927–1938* (Lawrence: University Press of Kansas, 1988), p. 132.

81 D'Este, *Patton*, p. 296.

82 Zaloga, *Early U.S. Armor*, p. 22.

83 Cameron, *Mobility, Shock, and Firepower*, pp. 33–35.

84 Memo from Acting Chief of Staff dward O. Croft to C/S, 537.3 (4 December 1929), RG 94, National Archives.

85 Donald L. Caldwell, *Thunder on ataan: The irst*

American Tank Battles of World War II (Guilford, CT: Stackpole Books, 2019), p. 25.

86 Cameron, *Mobility, Shock, and Firepower*, p. 41.

87 Zaloga, *Early U.S. Armor*, p. 25.

88 Constance McLaughlin Green et. al., *The U.S. Army in World War II, The Technical Services: The Ordnance Department, Planning Munitions for War* (Washington: Center of Military History, 1990), p. 194.

89 Joseph M. Colby, 'Contributions of Industry to Ordnance Tank-Automotive Engineering', *SAE Transactions*, Vol. 53 (1945), p. 537.

90 Green, *The Ordnance Department*, p. 195.

91 Cameron, *Mobility, Shock, and Firepower*, p. 119.

92 Ibid., pp. 52–53.

93 Paul M. Robinett, *Armor Command: The Personal Story of a Commander of the 13th Armored Regiment: of CCB, 1st Armored Division, and of the Armored School during World War II* (Washington: McGregor & Werner, 1958), p. 11.

94 Green, *The Ordnance Department*, p. 67.

95 D'Este, *Patton*, p. 380.

96 Niall Barr, *Yanks and Limeys: Alliance Warfare in the Second World War* (London: Jonathan Cape, 2015), pp. 95–97.

97 David Fletcher and Steven J. Zaloga, *British Battle Tanks: U.S. Made Tanks of World War II* (Oxford: Osprey Publishing Ltd, 2018), pp. 46–47.

98 Barr, *Yanks and Limeys*, p. 101.

99 Filippo Cappellano and Pier Paolo Battistelli, *Italian Light Tanks 1919–45* (Oxford: Osprey Publishing Ltd, 2012), pp. 5–12.

100 John Joseph Timothy Sweet, *Iron Arm: The Mechanization of Mussolini's Army, 1920-40* (Mechanicsburg: Stackpole Books, 2006), p. 61.

101 Ibid., pp. 83–84.

102 Brian R. Sullivan, 'The Italian Armed Forces, 1918-40', in *Military Effectiveness, Volume II, The Interwar Years*, edited by Allan R. Millet (New York: Cambridge University Press, 1988), pp. 169–217 (p. 188).

103 Nicola Pignato and Filippo Cappellano, *Gli Autoveicoli da Combattimento dell'Esercito Italiano, Volume 1: Dalle Origini fino al 1939* [The Combat Vehicles of the Italian Army, Volume 1: From its Origins to 1939] (Rome: Stato maggiore dell'esercito, ufficio storico, 2002), pp. 493–95.

104 Lucas Molina Franco and Jose M, Garcia, *Soldiers of von Thoma: Legion Condor Ground Forces in the Spanish Civil War 1936–1939* (Atglen, PA: Schiffer Military History, 2008), p. 18.

105 Stephen J. Zaloga, *Spanish Civil War Tanks: The Proving Ground for Blitzkrieg* (Oxford: Osprey Publishing Ltd, 2011).

106 Estimated cost based on Italian investments in tank development, 1938–1941.

107 Sweet, *Iron Arm*, p. 109.

108 John Gooch, *Mussolini's War: Fascist Italy from Triumph to Collapse, 1935–1943* (New York: Pegasus Books, 2020), pp. 57–59.

109 Beale, *Death by Design*, pp. 176–77.

CHAPTER 2

1 Mario Montanari, *Le Operazioni in Africa Settentrionale. Vol. I – Sidi el Barrani (Giugno 1940–Febbraio 1941)* (Rome: Stato maggiore dell'esercito, ufficio storico, 1990), p. 72.

2 Filippo Cappellano, 'Il VII Battaglione Carri M', *Rassegna dell'Esercito* [Amy Review], No. 1 (2015), pp. 31–33.

3 Gooch, *Mussolini's War*, p. 203.

4 Ibid., p. 71.

5 The Commando Superiore Africa Settentrionale or Commander-in-chief North Africa was called the 'Superasi'.

6 6 RTR War Diary, entry for 25 August 1939.

7 George M. O. Davy, *The Seventh and Three Enemies: The Story of World War II and the 7th Queen's Own Hussars* (Uckfield: The Naval & Military Press, 2014), p. 11.

8 Ian S. O. Playfair, *The Mediterranean and Middle East Volume I: The Early Successes Against Italy* (Uckfield: The Naval & Military Press, 2004), pp. 93, 188.

9 Kenneth Macksey, *Armoured Crusader: The Biography of Major-General Sir Percy Hobo Hobart* (London: Grub Street, 2004), pp. 170–71.

10 David Hughes et. al., *The British Armies in World War Two, An Organizational History, Vol. 1, British Armoured and Cavalry Divisions* (George F. Nafziger Collection, 1999), pp.102–03.

11 Ibid., p. 43.

12 P. M. Knight, *A15 Cruiser Mk. VI Crusader Tank: A Technical History* (Columbia, SC: Black Prince Publications, 2015), p. 17.

13 Macksey, *Armoured Crusader,* pp. 103.

14 John Ferris, 'The British Army, Signals and Security in the Desert Campaign, 1940–42', in *Intelligence and Military Operations*, edited by Michael I. Handel (London: Frank Cass and Co. Ltd., 1990), pp. 255–91.

15 F. H. Hinsley et. al., *British Intelligence in the Second World War, Volume 1* (London: Her Majesty's Stationery Office, 1979). 199–200.

16 Ibid., pp. 378.

17 Carl von Clausewitz, *On War* (New York: Penguin Books, 1983), p. 131.

18 Charles Burdick and Hans-Adolf Jacobsen (ed.), *The Halder War Diary 1939–1942* (Novato, CA: Presidio Press, 1988), p. 242.

19 *The Halder War Diary*, p. 258.

20 Veterans of the 3rd Panzer Division, *Armoured Bears: The German 3rd Panzer Division in World War II, Volume II* (Mechanicsburg, PA: Stackpole Books, 2013), p. 129.

21 Gooch, *Mussolini's War*, p. 119.

22 *The Halder War Diary*, pp. 269–71, 276.

23 Gooch, *Mussolini's War*, pp. 131–32.

24 Hugh Trevor-Roper, *Hitler's War Directives 1939–1945* (Edinburgh: Birlinn Ltd, 1964), p. 85.

25 Butler, *Field Marshal*, p. 132.

26 John Ward, *Hitler's Stuka Squadrons: The Ju-87 at War 1936–1945* (St Paul, MN: MBI Publishing Co, 2004), pp. 117–18.

CHAPTER 3

1 George M. O. Davy, *The Seventh and Thee Enemies* (Uckfield: The Naval and Military Press, 2014), p. 29.

2 Dudley Clarke, *The Eleventh At War: Being the Story of the XIth Hussars (Prince Albert's Own) Through the Years 1934–1945* (London: Michael Joseph, 1952), pp. 92–94.

3 Davy, *Seventh and Three Enemies*, p. 30.

4 Montanari, *Le operazioni in Africa settentrionale, vol I*, pp. 64–65.

5 Kenneth Macksey, *Beda Fomm: The Classic Victory (New York: Ballantine Books, 1971)*, p. 15.

6 Nicola Pignato, *La Colonna D'Avanzo*, *Storia Militare*, No. 55 (1998).

7 Correlli Barnett, *The Desert Generals* (London: Cassel & Co, 1983), p. 27.

8 Davy, *Seventh and Three Enemies*, pp. 35–37.

9 Janusz Ledwoch, '*Czolgi Mussoliniego*', [Mussolini's Tanks], *Tank Power*, Vol. XXIX, No. 253, Wydawnictwo Militaria (2006).

10 Macksey, *Beda Fomm,* p. 33.

11 Steven J. Zaloga, *The Anti-Tank Rifle* (Oxford: Osprey Publishing Ltd, 2018), p. 54.

12 Playfair, *The Mediterranean and Middle East Volume I*, pp. 209–10.

13 Montanari, *Le operazioni in Africa settentrionale, vol I*, pp. 114–15.

14 7 RTR War Diary, Movement Order No. 6, October 1940.

15 Macksey, *Beda Fomm,* pp. 50, 54.

16 Clarke, *Eleventh At War*, pp. 129–31.

17 War Diary, 11th Hussars, 19 November 1940 entry.

18 *Tenente Colonnello* Luigi Criniti, *Account of Battle of Alam Abu Hileiqat, 21 November 1940* [Captured Document], War Diary of C Battery, Royal Horse Artillery, November 1940.

19 Patrick Delaforce, *Battles with Panzers: Monty's Tank Battalions, 1 RTR & 2 RTR at War* (Borough: Lume Books, 2021), p. 226.

20 Macksey, *Beda Fomm,* p. 65.

21 Howard R. Christie, *Fallen Eagles: The Italian 10th Army in the Opening Campaign in the Western Desert, June 1940* (Auckland, NZ: Pickle Partners Publishing, 2014).

22 MTP No. 22, Tactical Handling of Army Tank Battalions, Part III (War Office, September 1939), Section 5, 6, 8, 9.

23 Liddell Hart, *The Tanks*, p. 45.
24 Montanari, *Le Operazioni in Africa Settentrionale, vol I*, p. 216.
25 Montanari, *Le Operazioni in Africa Settentrionale, vol I*, p. 219.
26 Davy, *Seventh and Three Enemies*, p. 62.
27 Delaforce, *Battles with Panzers*, p. 226.
28 *La Prima Offensiva Britannica in Africa Settentrionale* (Ottobre 1940–Febbraio 1941), Volumes I and II (Rome: Stato maggiore dell'esercito, ufficio storico, 1961), p. 374.
29 Clarke, *Eleventh At War*, pp. 136–37.
30 Macksey, *Beda Fomm,* p. 91.
31 Montanari, *Le Operazioni in Africa Settentrionale, vol I*, pp. 248.
32 Montanari, *Le Operazioni in Africa Settentrionale, vol I*, pp. 271.
33 Gavin Long, *To Benghazi* (Canberra: Australian War Memorial, 1961), p. 166.
34 Long, *Benghazi*, pp. 171–72.
35 Ibid., pp. 220–25.
36 Davy, *Seventh and Three Enemies*, pp. 79–81.
37 Playfair, *The Mediterranean and Middle East Volume I*, p. 353.
38 Thomas L.entz, *Tank Combat in North Africa: The Opening Rounds* (Atglen, PA: Schiffer Military History, 1998), p. 56.
39 Barrie Pitt, *Wavell's Command: The Crucible of War Book 1* (Sharpe Books Ltd, 2019), pp. 181–82.
40 George Forty, *The First Victory: O'Connor's Desert Triumph* (Tunbridge Wells: The Nutshell Publishing Co. Ltd, 1990), pp. 170–71.
41 Clarke, *Eleventh At War*, p. 147.
42 Simon Godfrey, *British Army Communications in the Second World War: Lifting the Fog of Battle* (London: Bloomsbury Publishing, 2013), p. 94.
43 Antonello Biagini and Fernando Frattolillo, *Diario Storico del Comando Supremo Vol III, Tomo 1 – Parte Prima* (Rome: Stato maggiore dell'esercito, ufficio storico, 1989), p. 250.
44 Pitt, *Wavell's Command*, p. 190.
45 Macksey, *Beda Fomm,* p. 134.
46 Biagini and Frattolillo, *Diario Storico del Comando Supremo Vol III,* p. 262.
47 Pitt, *Wavell's Command*, pp. 193–94.
48 Ibid., pp. 198–99.
49 Hart, *The Tanks,* p. 59.
50 Delaforce, *Battles with Panzers*, p. 235.
51 Ibid., pp. 62–63.
52 Pitt, *Wavell's Command*, p. 212.
53 Macksey, *Beda Fomm,* p. 151.
54 Pitt, *Wavell's Command*, p. 211.
55 Liddell Hart, *The Tanks,* p. 61.
56 Pierluigi Romeo di Colloredo Mels, *From Sidi el Barrani to Beda Fomm 1940–1941: Operation* Compass*: An Italian Perspective* (Rome: Luca Cristini Editore, 2020).
57 Knight, *A15 Cruiser Mk. VI Crusader Tank*, p. 17.
58 Delaforce, *Battles with Panzers*, p. 237.

CHAPTER 4

1 Martin Gilbert (ed.), *The Churchill War Papers: The Ever-widening War, Volume 3, 1941* (New York: W. W. Norton & Company, 2001), p. 212.
2 Sheila Lawlor, 'Greece, March 1941: The Politics of British Military Intervention', *The Historical Journal*, Vol. 25, No. 4 (1982), pp. 933–46.
3 Archibald Wavell, *Despatch on Operations in the Middle East From 7th February, 1941 to 15th July 1941* (London: War Office, 1946)
4 Ian S. O. Playfair, *The Mediterranean and Middle East Volume II: The Germans Come to the Help of their Ally* (Uckfield: The Naval & Military Press, 2004), p. 3.
5 Hinsley, *British Intelligence in the Second World War, Volume 1*, p. 386.
6 Barton Maughan, *Tobruk and El Alamein, Australia in the War of 1939–1945*, Series One (Army), Volume III (Australian War Memorial, 1966), p. 4.
7 Andrea Rebora, *Carri Ariete combattono: Le vicende della divisione corazzata Ariete nelle lettere del tenente Pietro Ostellino, Africa settentrionale 1941–1943* (Rome: Prospettivaeditrice, 2016), p. 41.
8 Cappellano, 'Il VII Battaglione Carri M', pp. 31–33.

9 Karl Gundelach, *Die deutsche Luftwaffe im Mittelmeer 1940–1945* (Frankfurt am Main: Lang, 1981), pp. 109–10.

10 War Diary, 11th Hussars, 14 February 1941 entry.

11 Mario Montanari, *Le Operazioni in Africa Settentrionale. Vol. II – Tobruk (Marzo 1941–Gennaio 1942)* (Rome: Stato maggiore dell'esercito, ufficio storico, 1993), pp. 22–23, 36–37.

12 Robert J. Edwards, *Tip of the Spear: German Armored Reconnaissance in Action in World War II* (Mechanicsburg: Stackpole Books, 2015), pp. 193–94.

13 Ibid.

14 Playfair, *The Mediterranean and Middle East Volume II*, p. 11.

15 Gerhard Schreiber et. al., *Germany and the Second World War, Vol. III, The Mediterranean, South-East Europe, and North Africa, 1939-1941* (Oxford: Oxford University Press, 2015), p. 673.

16 Ibid., p. 659.

17 Appendix A, Diary of Lieutenant Joachim Schorn, 26 February–30 March 1941, Installment 1, Weekly Intelligence Bulletin No. 5, General Staff Branch, 6th Australian Division, 8 September 1941, AWM52 1/5/12/19.

18 Jentz, *Tank Combat in North Africa,* p. 82.

19 Pier Paolo Battistelli, *Rommel's Afrika Korps: Tobruk to El Alamein* (Oxford: Osprey Publishing Ltd, 2006), p. 15.

20 OKH, Genst.d.H/Gen.Qu No. 074/41 g.Kdos., 11 February 1941, 'Vortragnotiz über Auswirkungen des Unternehmen Sonnenblume auf das Unternehmen Barbarossa', NAM (National Archives Microfilm), Series T-78, Roll 324, Frames 6279177–79.

21 Liddell Hart (ed.), *The Rommel Papers,* p. 103.

22 Also known as Marsa al Brega.

23 *The Halder War Diary*, p. 339.

24 Butler, *Field Marshall*, pp. 193–94, 196.

25 *The Halder War Diary*, p. 331.

26 Jentz, *Tank Combat in North Africa,* p. 88.

27 Pitt, *Wavell's Command*, p. 274.

28 Appendix B, 'Policy for Defence of Cyrenaica,' 2840/G, 9th Australian Division, General Staff Branch, April 1941, part 2, appendices, AWM52, 1/5/20.

29 *Die Deutsche Wochenschau,* NSRL 561, 7 May 1941.

30 Volkmar Kühn, *Mit Rommel in der Wüste: Kampf u. Untergang d. Dt. Afrika-Korps 1941–1943* (Stuttgart: Motorbuch Verlag, 1975), pp. 19–20.

31 Maughan, *Tobruk and El Alamein*, pp. 50–51.

32 Mark Urban, *The Tank War* (London: Abacus, 2014), pp. 43–49.

33 Jentz, *Tank Combat in North Africa,* pp. 92–94.

34 *The Halder War Diary*, p. 348.

35 Raugh, *Wavell in the Middle East*, p. 192.

36 Playfair, *The Mediterranean and Middle East Volume II*, p. 22.

37 Appendix A, Diary of Oberstleutnant Gustav Ponath, Intelligence summary No. 40, General Staff Branch, 9th Australian Division, 17 May 1941, AWM52 1/5/20/8.

38 Maughan, *Tobruk and El Alamein*, p. 67.

39 Ibid., pp. 69–76.

40 Kühn, *Mit Rommel in der Wüste*, pp. 28–29.

41 John Bierman and Colin Smith, *War Without Hate: The Desert Campaign of 1940–1943* (New York: Penguin Books, 2004), p. 67.

42 David Irving, *The Trail of the Fox* (New York: Avon Books, 1977), p. 93.

43 Jentz, *Tank Combat in North Africa,* p. 97.

44 Bierman and Smith, *War Without Hate*, p. 70.

45 Each Ju-52 could carry about 400 litres of fuel in drums, so five sorties would equal about 2 cubic metres or 2,000 litres.

46 Pier Paolo Battistelli, *Italian Army Elite Units & Special Forces 1940–43* (Oxford: Osprey Publishing Ltd, 2011), p. 8.

47 Jentz, *Tank Combat in North Africa,* p. 98.

48 2/15th Infantry War Diary, February–April 1941, AWM52 8/3/15/12.

49 Hart, *The Tanks*, p. 72.

50 Forty (ed.), *Jake Wardrop's Diary*, pp. 30–31.

51 Ian Walker, *Iron Hulls Iron Hearts: Mussolini's Elite Armoured Divisions in North Africa*

(Ramsbury: The Crowood Press, 2006), p. 83.

52 Maughan, *Tobruk and El Alamein*, pp. 104–08.

53 Ibid., pp. 119–20.

54 Davy, *Seventh and Three Enemies*, pp. 94–97.

55 Adalbert von Taysen, *Tobruk 1941: Der Kampf in Nordafrika* (Freiburg: Rombach, 1976), pp. 99–100.

56 Maughan, *Tobruk and El Alamein*, p. 133.

57 Jentz, *Tank Combat in North Africa,* pp. 105–06.

58 Appendix A, Diary of Oberstleutnant Gustav Ponath, Intelligence summary No. 40, General Staff Branch, 9th Australian Division, 17 May 1941, AWM52 1/5/20/8.

59 Maughan, *Tobruk and El Alamein*, pp. 151–52.

60 Jentz, *Tank Combat in North Africa*, pp. 107–14.

61 Liddell Hart (ed.), *The Rommel Papers,* p. 125.

62 Alternative spelling 'Ras el Medauuar'. Referred to as 'Carrier Hill' by the Australians and 'Point 209' by the Italians.

63 Rebora, *Carri Ariete combattono*, pp. 65–66.

64 Walker, *Iron Hulls Iron Hearts*, pp. 87–88.

65 *The Halder War Diary*, p. 374.

66 On September 1939, the 4. Panzer-Division lost 42–45 tanks in the assault on Warsaw, roughly 13 per cent losses.

67 On 5 June 1940, the 10. Panzer-Division had about 100 tanks knocked out by French anti-tank defences, roughly 50 per cent losses.

68 Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge: Cambridge University Press, 1977), p. 186.

69 Fritz Morzik, *German Air Force Airlift Operations* (Honolulu: University Press of the Pacific, 2002), pp. 122–23.

70 Lukas Friedli, *Repairing the Panzers: German Tank Maintenance in World War 2, Volume 2* (Monroe, NY: Panzerwrecks, 2011), p. 104.

71 Jentz, *Tank Combat in North Africa,* p. 121.

72 Maughan, *Tobruk and El Alamein*, pp. 190–91.

73 Ibid., pp. 201–02.

74 Ibid., p. 207.

75 This minefield had been laid based on the recommendation of Colonel Horace Birks, who had been seconded from 7th Armoured Division to advise the Australians on anti-tank measures.

76 Appendix A, Diary of Lieutenant Joachim Schorm, 29 April–7 May 1941, Intelligence Summary No. 72, General Staff Branch, 9th Australian Division, 26 June 1941, AWM52 1/5/20/10.

77 Jentz, *Tank Combat in North Africa,* pp. 120–23.

78 Appendix B, Account of Operations Against 2/24 Battalion, 30 April to 1 May, Actions of Tanks, Afternoon 1 May, 17 May 1941, General Staff Branch, 9th Australian Division, 27 June 1941, AWM52 1/5/20/8.

79 Pitt, *Wavell's Command*, pp. 302–03.

80 ATI No. 2, The Employment of Army Tanks in Co-operation with Infantry (War Office, March 1941), paragraph 5.

81 Colonnello Ugo Montemurro was the commander of the Italian 8° Reggimento Bersaglieri from the Ariete Division. Montemurro fought in the First World War and was captured at the Battle of Caporetto in October 1917 by Rommel's battalion.

82 Liddell Hart, *The Tanks,* p. 78.

83 4 RTR, War Diary, 15 May 1941.

84 Playfair, *The Mediterranean and Middle East Volume II*, p. 160.

85 Jentz, *Tank Combat in North Africa*, p. 133.

86 Cramer had been in command of Panzer-Regiment 8 for only seven weeks and he had limited prior experience with tanks. He had spent much of the 1930s as a cavalry instructor.

87 Jentz, *Tank Combat in North Africa*, p. 148.

88 Playfair, *The Mediterranean and Middle East Volume II*, p. 163.

89 Patrick Delaforce, *Taming the Panzers: Monty's Tank Battalions, 3 RTR at War* (Borough: Lume Books, 2021), p. 89.

90 Fletcher, *British Battle Tanks*, pp. 66–83.

91 Field Marshall Lord Alanbrooke, *War Diaries 1939–1945* (London: Phoenix Press, 2002), p. 165.

92 Playfair, *The Mediterranean and Middle East Volume II*, p. 114.

93 Jonathan Dimbleby, *Destiny in the Desert: The*

Road to El Alamein – The Battle that Turned the Tide (London: Profile Books Ltd, 2012), pp. 99–100.
94 Alanbrooke, *War Diaries*, p. 152.
95 Archie Munro, *The Winston Specials, Troopships via the Cape 1940–1943* (Liskeard: Maritime Books, 2006), pp. 138–39.
96 Raugh, *Wavell in the Middle East*, p. 201.
97 Liddell Hart, *The Tanks,* pp. 84.
98 Dimbleby, *Destiny in the Desert*, pp. 102–03.
99 Barnett, *Desert Generals*, pp. 72–73.
100 Colin Smith, *England's Last War against France: Fighting Vichy France 1940–1942* (London: Phoenix, 2010), pp. 191–92.
101 J. R. M. Butler, *Grand Strategy, Vol. II, September 1939–June 1941* (London: His Majesties Stationary Office, 1971), pp. 530–32.
102 Lidell Hart, *The Tanks,* p. 81.
103 Janusz Piekalkiewicz, *Rommel and the Secret War in North Africa, 1941–1943* (West Chester: Schiffer Publishing Ltd, 1992), p. 59.
104 Neumann-Silkow was a Prussian cavalry office who had previously commanded a motorized infantry brigade in the 8. Panzer-Division during the French campaign.
105 Jentz, *Panzertruppen*, Volume 1, p. 167.
106 Ibid.
107 Irving, *Trail of the Fox*, p. 124.
108 Jentz, *Tank Combat in North Africa,* p. 172.
109 Liddell Hart, *The Tanks,* p. 85.
110 WO 169/1700, War Diary, 2nd Battalion Scots Guards, 22 November 1941.
111 Diari Storici Seconda Guerra Mondiale (War Diary), N1-N11, Box 908, 61º Reggimento Fanteria, June–September 1941, Archivio Uffici Storico Stato Maggiore Esercito (AUSSME).
112 Piero Crociani and Pier Paolo Battistelli, *Italian Soldier in North Africa 1941–43* (Oxford: Osprey Publishing Ltd, 2013), p. 18.
113 Hart, *The Tanks*, p. 86.
114 WO169/1429, War Diary, 4 RHA, 15 June 1941.
115 Neal Dando, *From Tobruk to Tunis: The Impact of Terrain on British Operations and Doctrine in North Africa, 1940–1943* (Solihull: Helion and Company, 2016), pp. 90–91.
116 Schreiber, *Germany and the Second World War,* p. 703.
117 Franz Kurowski, *Panzer Aces III: German Tank Commanders in Combat in World War II* (Mechanicsburg: Stackpole Books, 2010), p. 279.
118 Baron Antoine-Henri Jomini (1779–1869), one of the most influential military theorists of the 19th century, wrote heavily about the role of logistics in operational warfare. Jomini's approach to warfare emphasized attacks on enemy lines of communications to put them at a disadvantage. In contrast, Clausewitz stressed battles of encirclement to destroy the enemy main forces.
119 Irving, *Trail of the Fox*, p. 128.
120 Jentz, *Tank Combat in North Africa,* p. 183.
121 *German Tank Maintenance in World War II*, Department of the Army Historical Study, No. 20–202 (Washington: Center of Military History, 1954), p. 18.
122 Schreiber, *Germany and the Second World War,* p. 703.
123 Jentz, *Panzertruppen*, Volume 1, p. 167.
124 Raugh, *Wavell in the Middle East*, p. 238.
125 Barnett, *Desert Generals*, p. 77.
126 Knight, *A15 Cruiser Mk. VI Crusader Tank*, pp. 18–19.

CHAPTER 5

1 Barnett, *Desert Generals*, p. 85.
2 Friedrich von Mellenthin, *Panzer Battles: A Study of the Employment of Armour in the Second World War* (New York: Ballantine Books, 1971), pp. 52–53.
3 Schreiber, *Germany and the Second World War*, pp. 705–06.
4 The Germans created z.b.V. (*zur besonderen Verwendung*) units for special duties. Essentially, these were ad hoc divisions formed from bits and pieces, organized and sent to North Africa. It was not a fully organized division at start, but eventually became 90.leichte-Division.
5 *Munition - Heer: August 1941*. OKH, Armaments

& Munitions Production Data 1932–41. NAM (National Archives Micofilm), series T-78, Roll 143.

6 Hillary L. Doyle and Thomas J. Jentz, *Panzer Tracts, Volume 3-2, Panzerkampfwagen III Ausf.E, F, G, and H Development and Production from 1938 to 1941* (Boyds, MD: Panzer Tracts, 2007).

7 Crociani and Battistelli, *Italian Soldier*, p. 9.

8 Ibid., p. 22.

9 Battistelli, *Rommel's Afrika Korps*, pp. 72–73.

10 Mario Montanari, *Le Operazioni in Africa Settentrionale. Vol. II*, pp. 349, 426.

11 Walker, *Iron Hulls Iron Hearts*, p. 93.

12 Barr, *Yanks and Limeys*, p. 149.

13 He was assigned to the 142nd Armored Signal Company, 2nd Armored Division.

14 Ian S. O. Playfair, *The Mediterranean and Middle East Volume III: British fortunes reach their lowest ebb* (Uckfield: The Naval & Military Press, 2004), p. 9.

15 Davy, *Seventh and Three Enemies*, p. 128.

16 Jentz, *Panzertruppen*, p. 168.

17 Barnett, *Desert Generals*, p. 85.

18 Robert Crisp, *Brazen Chariots* (New York: W. W. Norton & Company, 1959), pp. 23–24.

19 Davy, *Seventh and Three Enemies*, pp. 132–33.

20 Denis Richards and Hillary S. G. Saunders, *The Royal Air Force 1939 to 1945, Vol. II, The Fight Avails* (London: HMSO, 1954), p. 161.

21 Playfair, *The Mediterranean and Middle East Volume III*, p. 11.

22 Jim Henderson, *4th and 6th Reserve Mechanical Transport Companies*, New Zealand Official History (Wellington: Historical Publications Branch, 1954), p. 107.

23 C. N. Donnelly, 'Soviet Tactical Pipelines', *The RUSI Journal*, No. 119, No. 2 (1974), pp. 56–59.

24 Irving, *Trail of the Fox*, p. 149.

25 William Manchester and Paul Reid, *The Last Lion: Winston Spencer Churchill: Defender of the Realm, 1940-1965* (New York: Bantam Books, 2013), p. 374.

26 Playfair, *The Mediterranean and Middle East Volume III*, pp. 5–7.

27 F. H. Hinsley et. al., *British Intelligence in the Second World War, Volume II*, Appendix 14: Technical Intelligence on Tank and Anti-Tank Weapons in North Africa (Cambridge: Cambridge University Press, 1981), pp. 705–18.

28 Stuart Pitman, *Second Royal Gloucestershire Hussars Libya-Egypt 1941–1942* (Uckfield: Naval & Military Press, 2014), p. 11.

29 A very similar phenomenon occurred in 1973, when Israeli tankers failed to appreciate that the contemporary Egyptian infantrymen had improved considerably since their poor performance in the 1967 war.

30 Dando, *From Tobruk to Tunis*, p. 99.

31 Davy, *The Seventh and Three Enemies*, p. 144.

32 Ibid., p. 145.

33 War Diary, 3rd County of London Yeomanry, 18 November 1941.

34 Von Mellenthin, *Panzer Battles*, pp. 72–74.

35 Barnett, *Desert Generals*, p. 95.

36 Walker, *Iron Hulls Iron Hearts*, p. 94.

37 Roberto Polini, 'L'Ariete si batte a Bir El Gobi', *Il Carrista d'Italia*, Anno LIV, No. 7/8/9 (September 2013), p. 14.

38 Walker, *Iron Hulls Iron Hearts*, p. 97.

39 Polini, 'L'Ariete', p. 14.

40 Pitman, *Second Royal Gloucestershire Hussars*, pp. 11–12.

41 Geoffrey Gordon-Creed and Roger Field, *Rogue Male: Death and Seduction Behind Enemy Lines with Mister Major Geoff* (London: Coronet, 2011), p. 48.

42 War Diary, 3rd County of London Yeomanry, 18 November 1941.

43 Pitman, *Second Royal Gloucestershire Hussars*, p. 18.

44 Ibid., pp. 13–14.

45 Ibid., pp. 20–21.

46 Gordon-Creed, *Rogue Male*, p. 49.

47 Pitman, *Second Royal Gloucestershire Hussars*, p. 13.

48 6 RTR War Diary, 19 November 1941.

49 Three years later, Rommel would complain when Hitler did not immediately release the Panzer reserves to deal with the Allied landings in Normandy, apparently forgetting his own prior

high-handedness with subordinates.

50 Von Mellenthin, *Panzer Battles*, p. 74.

51 Urban, *Tank War*, p. 79.

52 Andreas Biermann, 'A Reassessment of the Tank Battle between 4th Armoured Brigade and Panzer-Regiment 5 during Operation *Crusader* in North Africa on 19 November 1941', *Scienta Militaria: South African Journal of Military Studies*, Vol. 49, No. 1 (June 2021), pp. 91–114.

53 Bernd Hartmann, *Panzers in the Sand: The History of Panzer-Regiment 5, 1942–45*, Vol. 2 (Mechanicsburg: Stackpole Books, 2011), p. 68.

54 Von Mellenthin, *Panzer Battles*, p. 74.

55 Hermann Büschleb, *Operation* Crusader*: Tank Warfare in the Desert, Tobruk 1941* (Philadelphia: Casemate Publishers, 2019), p. 31.

56 Barnett, *Desert Generals*, pp. 97–98.

57 Büschleb, *Operation* Crusader, p. 32.

58 Crisp, *Brazen Chariots*, pp. 41–42.

59 Playfair, *The Mediterranean and Middle East Volume III*, p. 43.

60 Ibid., p. 42.

61 Davy, *Seventh and Three Enemies*, p. 152.

62 Von Mellenthin, *Panzer Battles*, pp. 78–79.

63 Liddell Hart, *The Tanks*, pp. 113–14.

64 Ia, Kriegstagebuch I, June 26, 1941–March 31, 1942, 90. Panzergrenadier-Division, NAM (National Archives Microfilm), Series T-315, Roll 1155.

65 J. A. I. Agar-Hamilton and L. C. F. Turner, *The Sidi Rezegh Battles 1941*, *South African Armed Forces in the Second World War* (Capetown: Oxford University Press, 1957), pp. 175–77.

66 6 RTR War Diary, 21 November 1941.

67 Thomas L. entz, *Panzer Tracts, Dreaded Threat – The 8.8 cm Flak 18 / 36 / 37 in the Anti-Tank Role* (Boyds, MD: Panzer Tracts 2001), p. 39.

68 Davy, *Seventh and Three Enemies*, pp. 155–56.

69 Jentz, *Panzertruppen*, Vol. 1, p. 170.

70 Liddell Hart, *The Tanks*, p. 112.

71 Richard Doherty, *British Armoured Divisions and their Commanders, 1939–1945* (Barnsley, UK: Pen & Sword, 2013), p. 119.

72 Hart, *The Tanks*, p. 117.

73 3 CLY War Diary, 22 November 1941.

74 Pitman, *Second Royal Gloucestershire Hussars*, p. 24.

75 Davy, *Seventh and Three Enemies*, p. 159.

76 WO 169/1700, War Diary, 2nd Battalion Scots Guards, 22 November 1941.

77 Delaforce, *Taming the Panzers*, p. 83.

78 Playfair, *The Mediterranean and Middle East Volume III*, p. 48.

79 Jentz, *Panzertruppen*, Vol. 1, pp. 170, 174.

80 Playfair, *The Mediterranean and Middle East Volume III*, p. 48.

81 'The Battle of the Omars', US Army, Military Intelligence Service, Information Bulletin No. 11, April 15, 1942, pp. 34–35, 41.

82 Ibid., p. 39.

83 Liddell Hart, *The Tanks*, pp. 114–15.

84 Büschleb, *Operation* Crusader, p. 42.

85 Walker, *Iron Hulls Iron Hearts*, p. 104.

86 Davy, *Seventh and Three Enemies*, p. 167.

87 W. E. Murphy, *Official History of New Zealand in the Second World War 1939–1945, Episodes and Studies Volume 2: Point 175 – The attle of Sunday of the Dead* (Wellington: Historical Publications Branch, Department of Internal Affairs, 1950), . 151.

88 Von Mellenthin, *Panzer Battles*, pp. 86–87.

89 Crisp, *Brazen Chariots,* pp. 68–70, 73.

90 Jentz, *Panzertruppen*, Vol. 1, p. 174

91 Liddell Hart, *The Tanks*, p. 126.

92 Murphy, *Official History*, p. 148.

93 Ibid., p. 147.

94 Ibid., p. 152,

95 Ronald Lewin, *Rommel as Military Commander* (Barnsley: Pen & Sword Books, 2004), p. 73.

96 Von Mellenthin, *Panzer Battles*, p. 89.

97 Barrie Pitt, *Auchinleck's Command: The Crucible of War Book 2* (Sharpe Books, 2019), p. 155.

98 On paper, each Panzer division had three fuel columns that carried a total of 150,000 litres of fuel, but there is no telling how much fuel from this reserve was consumed during the previous day or vehicles that may have been lost to enemy action.

99 Büschleb, *Operation* Crusader, pp. 48–50.

100 Playfair, *The Mediterranean and Middle East Volume III*, p. 52.
101 Pitt, *Auchinleck's Command*, p. 166.
102 Barnett, *Desert Generals*, p. 112.
103 Michael Carver, *Dilemmas of the Desert War: The Libyan Campaign 1940–42* (Staplehurst: Spellmount, 1986), p. 42.
104 Crisp, *Brazen Chariots*, pp. 95–96.
105 Urban, *Tank War*, p. 89.
106 Delaforce, *Taming the Panzers*, pp. 86–88.
107 Büschleb, *Operation* Crusader, p. 54.
108 Irving, *Trail of the Fox*, p. 165–66.
109 Liddell Hart, *The Tanks*, p. 129–30.
110 Agar-Hamilton and Turner, *The Midi Rezegh Battles*, p. 319.
111 'The Battle of the Omars', p. 33.
112 Liddell Hart, *The Tanks*, p. 132.
113 W. E. Murphy, *Official History of New Zealand in the Second World War 1939–1945, The elief of Tobruk*, (Wellington: War History Branch, 1961), pp. 271–72.
114 Von Mellenthin, *Panzer Battles*, p. 93.
115 Stuart Hamilton, *Armoured Odyssey: 8th Royal Tank Regiment in the Western Desert, 1940–42, Palestine, Syria, Egypt, 1943–44, Italy, 1944–45* (London: Tom Donovan, 1995), pp. 13–15.
116 Murphy, *The Belief of Tobruk*, pp. 283–85.
117 Büschleb, *Operation* Crusader, p. 66.
118 Bierman and Smith, *War without Hate*, p. 208.
119 Liddell Hart, *The Tanks*, p. 135.
120 Murphy, *The elief of Tobruk*, pp. 336–41.
121 Pitman, pp. 32–33.
122 Crisp, *Brazen Chariots*, p. 121.
123 Ibid., pp. 124–27.
124 Delaforce, *Taming the Panzers*, p. 89.
125 Crisp, *Brazen Chariots*, p. 143.
126 J. F. Cody, *21 Battalion*, Official istory of New Zealand in the Second World War 1939–1945 (Wellington: War History Branch, 1953), pp. 443–46.
127 T. A. Martin, *The Essex Regiment, 1929–1950* (Uckfield: Naval and Military Press, 2016), pp. 635–36.
128 Liddell Hart, *The Tanks*, p. 137.
129 Cody, *21 Battalion*, pp. 137–38.
130 Playfair, *The Mediterranean and Middle East Volume III*, p. 65.
131 Randal M. Burdon, *24 Battalion*, Official istory of New Zealand in the Second World War 1939–1945 (Wellington: War History Branch, 1953), pp. 86–87.
132 Urban, *Tank War*, p. 90.
133 W. A. Glue and D. J. C. Pringle, *20 Battalion and Armoured Regiment*, Official History of New Zealand in the Second World War 1939–1945 (Wellington: Historical Publications Branch, 1957), pp. 197–205.
134 Playfair, *The Mediterranean and Middle East Volume III*, p. 69.
135 Glue and Pringle, *20 Battalion*, p. 205.
136 Büschleb, *Operation* Crusader, p. 74.
137 Jim Henderson, *22 Battalion*, Official istory of New Zealand in the Second World War 1939–1945 (Wellington: Historical Publications Branch, 1958), pp. 121–22.
138 Walker, *Iron Hulls Iron Hearts*, p. 120.
139 Von Mellenthin, *Panzer Battles*, pp. 97–98.
140 Schreiber, *Germany and the Second World War*, p. 746.
141 Walker, *Iron Hulls Iron Hearts*, p. 122.
142 Pitman, *Second Royal Gloucestershire Hussars*, p. 37.
143 Playfair, *The Mediterranean and Middle East Volume III*, pp. 80–81.
144 Liddell Hart, *The Tanks*, p. 143.
145 Pitman, *Second Royal Gloucestershire Hussars*, pp. 42–45.
146 Piekalkiewicz, *Rommel and the Secret War*, p. 106.
147 Playfair, *The Mediterranean and Middle East Volume III*, p. 91.
148 Schreiber, *Germany and the Second World War*, pp. 750–51.
149 Pitt, *Auchinleck's Command*, p. 203.
150 Playfair, *The Mediterranean and Middle East Volume III*, p. 100.
151 Davy, *Seventh and Three Enemies*, pp. 206–07.
152 Pitt, *Auchinleck's Command*, pp. 223–24.
153 Knight, *A15 Cruiser Mk. VI Crusader Tank*, pp. 25–26, 31–33.
154 Hamilton, *Armoured Odyssey*, p. 15.

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